

Coal Age

AUGUST, 1957

A McGRAW-HILL PUBLICATION

PRICE \$1

Moving coal to the coast

Are the Railroads Ready for Tomorrow's Exports? p 54

New heavy-media washer

Continuous Face Haulage, New Washer at Wyatt..... p 62

Safety for workmen

Underground Life Preservers p 69

Performance report

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Planning with "toys"

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Conveyor checklists

Better Service From Belt Conveyors p 76

Foresighted roof-bolting

Take the Guess Out of Bolting a Roof p 80

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"Talk up" increased production—greater safety...with these

M - S - A

COMMUNICATION

SYSTEMS

M-S-A MINEPHONE

Dispatcher sends orders instantly and simultaneously to all motormen with this modern, underground two-way voice communication system. Motormen receive and reply while trips are in motion—keep haulage movements coordinated with production demands. This results in smoother, faster, and more continuous trip movements throughout the mine.

Messages clear tracks for outgoing loaded trips and incoming empties. This system puts an end to traffic tie-ups, errors and accidents; prevents excessive stop-and-start strain on equipment. Write for more detailed information.



• Dispatcher sends orders to motormen . . . routes right-of-way traffic . . . receives reports on positions and station conditions.

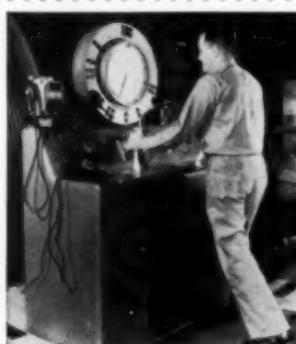


• "Jeep" operator requests instructions from dispatcher and maintenance shop for section assignment . . . speeds emergency repair.

M-S-A HOISTPHONE

For accurate, instant response between the hoisting engineer and cage, here's the voice communication system to install. Whatever the job—load leveling—shaft repairs—shaft inspection trips—passenger transportation—the M-S-A HoistPhone provides better safety and efficiency through dependable, continuous two-way voice communication at any level, and while the cage is in motion.

Requires no special training . . . simple to use . . . dependable in operation. Write for further information.



• The hoisting engineer is able to control all movements of the cage by communicating with cage rider over the M-S-A HoistPhone.



• Worker uses microphone in cage to tell the hoisting engineer where he wants to go. Loudspeaker mounted on top of cage.



When you have a safety problem, M-S-A is of your service . . . our job is to help you

MINE SAFETY APPLIANCES COMPANY

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At Your Service: 77 Branch Offices in the United States and Mexico

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.

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B.F.Goodrich report:



B.F.Goodrich belt resists fire, mildew and crushing impact

WHEN this Pennsylvania mine company ordered a B.F.Goodrich conveyor belt made with fire-resistant rubber, they took a big step toward increased mine safety without sacrificing belt life.

The belt has to be tough to take the 21 hours-a-day, 5 days-a-week service. It's exposed to dampness and mildew, must stand the crushing impact of 3 tons of coal each time a shuttle car unloads.

Yet this belt is expected to equal—or even surpass—the long service records made by other B.F.Goodrich Caricoal belts in underground service.

That's because the special fire-resistant rubber used in the belt also has high resistance to impact, abrasion, oil, grease, tearing, cutting, gouging, and even mildew attack.

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Let your B.F.Goodrich distributor show you how longer-lasting Caricoal conveyor belts can cut your coal-

handling costs, reduce maintenance costs, and if made with fire-resisting rubber, reduce the chance of fire in your underground mines. *B.F.Goodrich Industrial Products Co., Dept. M-134, Akron 18, Ohio.*

B.F.Goodrich
INDUSTRIAL PRODUCTS

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RED GREASES**



FULL DRUM
55 GALS.



QUARTER DRUM



PAIL—38 lbs.



CARTRIDGE—1 lb.
IN HANDY CARTRIDGE CARTON
10 per carton

You can't afford not to try them in your mining equipment. Hulbert Red Greases outperform every other lubricant now on the market for the mining industry. The reason: Hulbert Red Greases, containing Du Pont Esterasil GT, are your greatest protection against heat, water, oxidation and rust at lubricated points in your heavy-duty mining machinery.

Don't forget another leading member of Hulbert's family of Quality Lubricants, Hulbert's No. 11 Lubricant. Hydraulic systems and gear cases last longer and give trouble-free performance when you use Hulbert No. 11 Lubricant.

Look for the bright blue drum with the big red label, that's Hulbert, the year-in year-out choice of the mining industry.

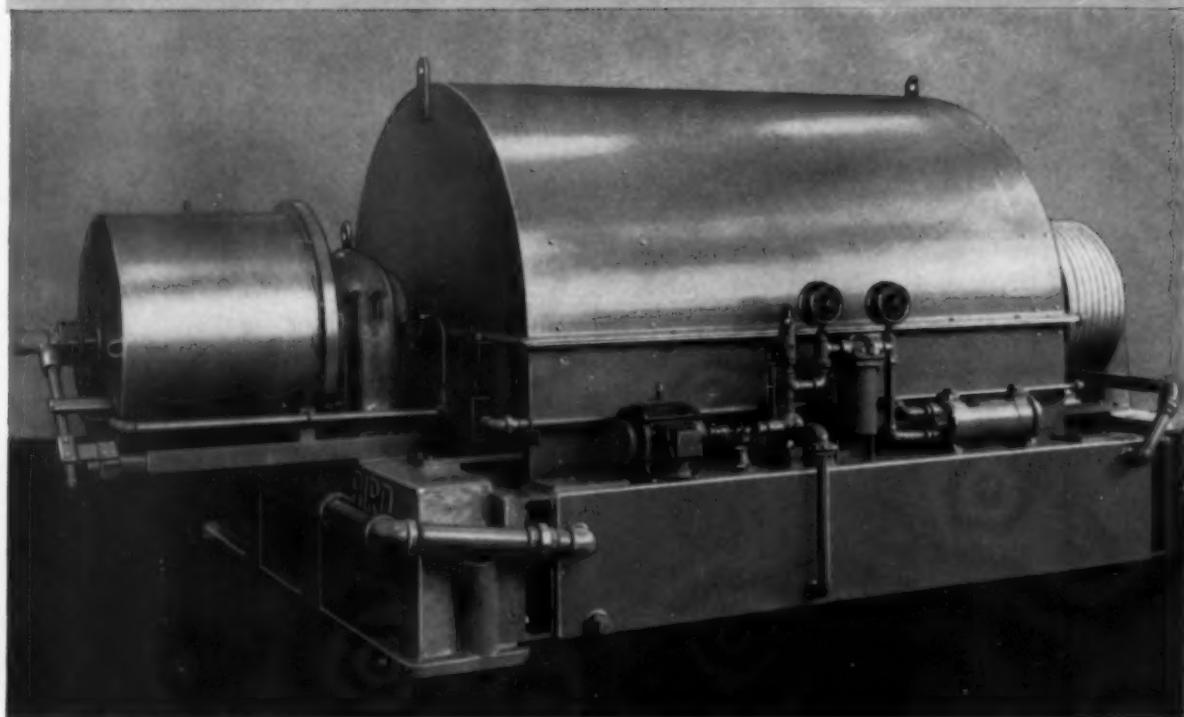
Hulbert

OIL AND GREASE COMPANY

PHILADELPHIA 34, PA.

Specialists in Quality Lubricants for the Coal Mining Industry

**When you select fine coal Dewatering
Equipment on the basis of lowest total
cost per ton you'll end up with
BIRD COAL FILTERS**



Don't let first cost of equipment mislead you. It is the *continuing* cost that counts, the net cost per ton you pay, day in and day out, over many years.

The Bird Coal Filter delivers $\frac{3}{8}$ " x 0 coal as dry as can be obtained mechanically at a total cost of six cents or less per ton, of which only one cent is for maintenance. This figure *includes* amortization. In other words, the Bird Coal Filter quickly pays for itself out of operation and maintenance savings.

*Ask us to work out the figures as they apply to
your daily tonnage.*

BIRD
MACHINE COMPANY

SOUTH WALPOLE, MASSACHUSETTS

Regional Office:
EVANSTON, ILLINOIS

PORLAND, OREGON

This Month in

AUGUST 1957

Coal Age

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► Transport

Are the Railroads Ready for Tomorrow's Exports? p 54

W. A. Raleigh, Jr., Assistant Editor, *Coal Age*

Export coal facilities at Philadelphia, Baltimore and Hampton Roads are more than adequate to handle the increasing volume of overseas traffic. On-the-spot interviews with management officials of the seven major rail carriers serving these ports show that each has much unused tidewater capacity and/or is adding new facilities. The potential for increasing practical-existing and soon-to-be completed capacity is fantastically large. Car supply is and will be adequate to cover all or nearly all orders for export loadings. The biggest headache is matching ship and car arrivals. Traffic snags also occur

when small operators ship mixed grades which require extra classification time at the port.

Featured—Photos of all major export piers; panel discussions: Plan Now for the Buyers' Market in Export; Producers Move to Export Coal via Charleston, S. C.

► Continuous Mining, Heavy-Media Washing

Continuous Face Haulage, New Washer Mark Wyatt Expansion p 62

A. E. Flowers, Associate Editor, *Coal Age*

Face operations at Wyatt-Seanor's No. 2 Gas mine were streamlined by adding bridge and chain conveyors to provide continuous face haulage. Colmols followed by pickup loaders feed coal to the conveyors at the rate of 400 tons per shift in room work. In harder coal in entries, average output is 350 tons per shift in 42-to 48-in coal.

A new compact Fuel Process heavy-media washer processes 200 tph, yielding a product with 5.8% ash. A major design feature is an integral vibrating screen that removes heavy media from the coal so that about 95% of the magnetite may be recirculated within the washing vessel.

Sidelight—Details of a mining plan designed to keep equipment moves to a minimum.

► Safety

Underground Life Preservers p 69

Emergency protection against carbon monoxide following mine fires or explosions is provided for individuals by the Self-Rescuer, a lightweight unit which affords security against the poisonous gas for a period of 30 min. This time interval permits a man to escape from a contaminated area. Planned distribution of the units throughout the mine and adequate training for the men are required for maximum protection.

(Continued on page 7)

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REPORT FROM RYERSON on Services and Products in Stock

In addition to the products shown below, you can call on Ryerson for flame-cut steel shapes, fabricated steel for reinforced concrete or steel frame construction—many other products and services. And equally important are the specialists who carry out the Ryerson quality control program

—see that customers' specifications are *exactly* met, that every order is correctly filled and promptly delivered. As a result you get unequalled service and certified quality when your company calls Ryerson for steel, aluminum, industrial plastics and machinery.



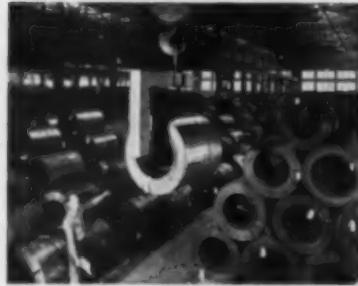
CARBON STEEL & ALLOY BARS
Most complete range of types, shapes and sizes as well as largest tonnage.



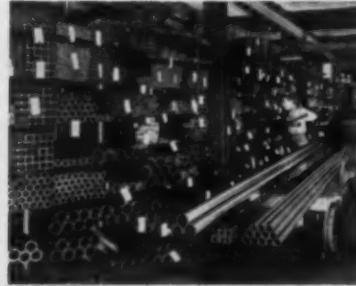
STRUCTURALS—I-beams, H-beams, channels, angles, tees and zees—all high quality steel to ASTM spec. A-7.



PLATES—14 types including special low carbon steel plates for forming and welding, leaded New E-Z-Cut, etc.



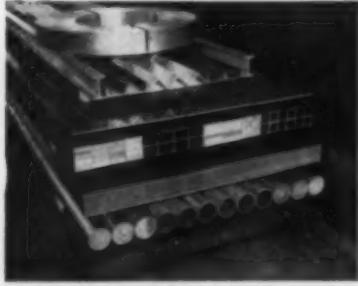
SHEET STEEL & STRIP—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.



TUBING—Seamless and welded steel tubing—mechanical tubing, fluid line, pump cylinder and structural tubing.



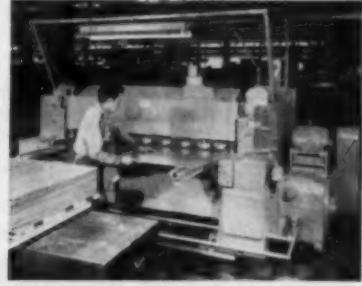
STAINLESS STEEL—Allegheny stainless in over 2,221 sizes, shapes, types, finishes: sheets, plates, bars, pipe, etc.



ALUMINUM—At many Ryerson plants—sheets, coils, plates, bars, tubing, architectural and structural shapes, etc.



INDUSTRIAL PLASTICS—PVC pipe, fittings, sheets and rods, rigid Kralastic and flexible polyethylene pipe.



MACHINERY & TOOLS—The broadest line of metal-working equipment available from a single source.

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JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE, N. C. • CINCINNATI
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This Month in Coal Age—Cont'd.

Sidelight—Three simple steps in using the Self-Rescuer.

► Stripping

How the Big Shovels Produce p 72

The Mountaineer has moved over 2,000,000 cu yd of overburden in a single month on a faster cycle and in deeper overburden than smaller machines. The big machine reopened pits previously worked by the smaller shovels and from which all coal had been loaded out. Marketable coal uncovered by the Mountaineer in 1956 amounted to 801,605 tons.

Highlights—How Hanna Coal's engineers plan and execute reopening of the old pits.



► Operations Planning

Trouble Shooting with Table Top Models p 74

Production men at U. S. Steel Co. mines, Gary, W. Va., find that miniature mine section layouts facilitate discussion and solution of underground problems. Trouble spots can thus be eliminated quickly and savings in production time and money are almost certain to result. Complete model set up includes plywood blocks arranged to simulate entries and crosscuts, haulage track, stoppings, check curtains and face machinery.

Along the Way—Photos showing typical model layout.

► Belt Conveyor

How to Get More and Better Service from Belt Conveyors p 76

Selecting the proper belt for a job is only the start in getting full return on a belt investment. To get long

(Continued on page 11)

This Month in Coal

EVEN TENOR—No surprises have been experienced in either the anthracite or bituminous industries so far in 1957—in production, in realization, or in the construction of new facilities or the modernization of those already in existence. Except for a strengthening of the production rate, this even tenor in coal will continue, since nothing indicates that there will be any surprises pop up in the remaining months of the year.

Business will improve in the remaining months, led by automobile production, which in turn will bring up steel and all other tributary industries, including coal. Consequently, a higher bituminous rate should prevail in the months to come, and the industry should wind up even with or better than the recent forecasts. Anthracite, always, will reflect the degree-day picture but, unless the weather is exceptionally warm should have a good year.

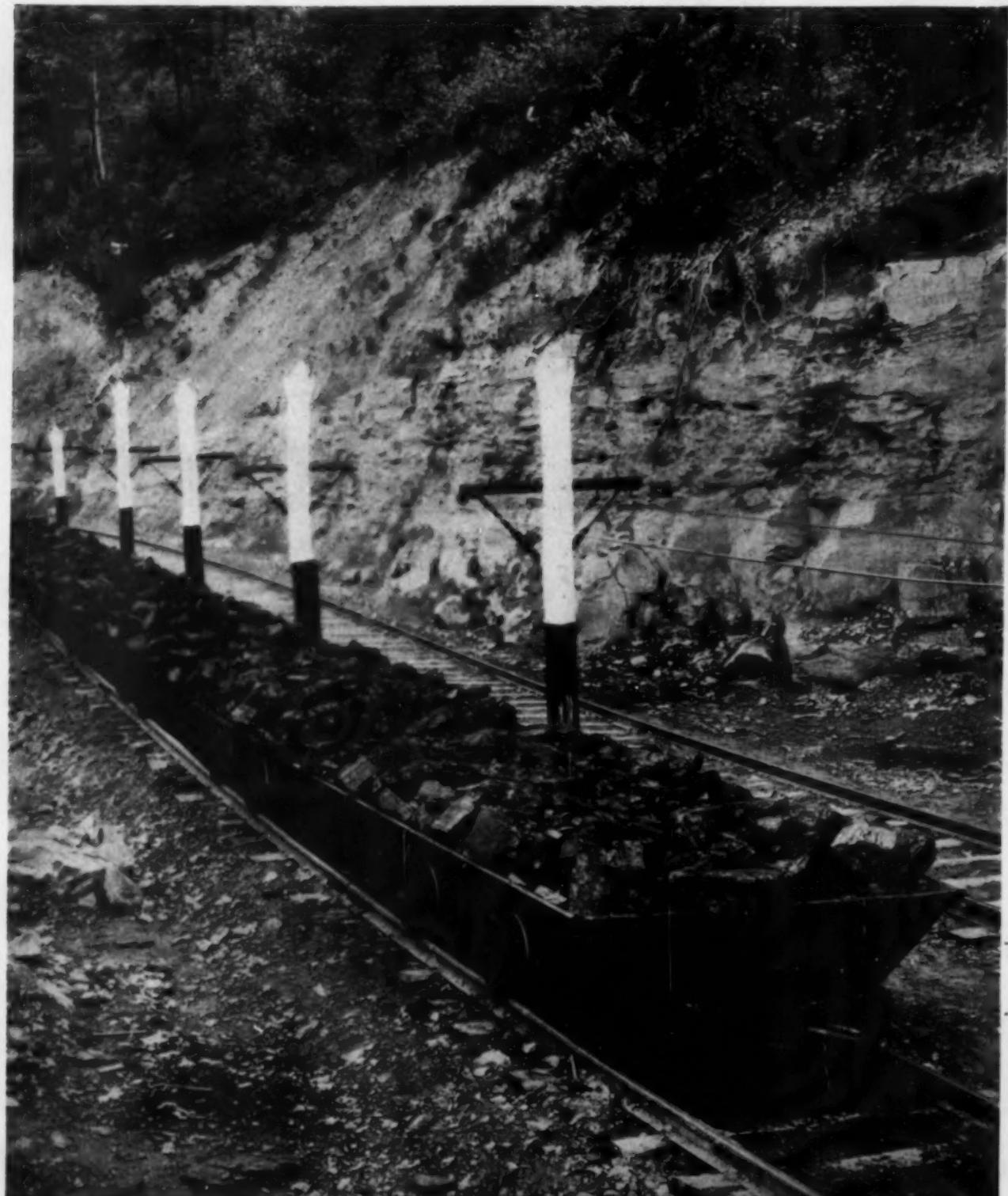
OIL IMPORTS—Whether oil-import curbs with real teeth will ever be adopted is still in the realm of conjecture. But the fact that the question continues to remain very much alive is evidence that many interests, aside from coal, consider the problem of what to do a very real one.

Some expression of national policy aimed at keeping the U. S. fuel industries in a state to meet any foreseeable emergency undoubtedly can be expected unless there is a radical change in world conditions. This conclusion is the only one that can be derived from the continued appointment of special study groups, such as the six-man cabinet team formed late in June to determine whether crude-oil imports are threatening national security. Maybe action will come in 1957. If not, and imports continue to rise, it will come eventually.

SYNTHETIC OIL—The fate of the government shale-oil plant at Rifle, Colo., was one of the questions up for grabs in Congress this session. It and the Louisiana (Mo.) facilities for producing oil from coal are the major remaining facilities erected under the Synthetic Liquid Fuels Act. Neither has operated for years, though basic and laboratory research still is being conducted, and a private group is having a go at recovery of oil from shale.

Meanwhile, construction of the Pitt Consol mine and char plant to serve the Kammer power plant, near Wheeling, W. Va., is producing under power, while pilot and semi-commercial plants using other char processes were being built or operated in other areas, particularly the western states. The chemicals from these plants will serve as the key to the door leading eventually to a liquid-fuel and gas industry based on coal.

COAL LEASES ON FEDERAL LANDS—The Senate has passed and sent to the House a bill, endorsed by the Interior Department, to raise the one-state ceiling on coal leases from 5,120 acres to 10,240 acres, and give the Secretary of the Interior discretionary authority to lease up to 5,120 more acres per state to one person or company.



TEXACO

August, 1957 • COAL AGE

How long can you keep equipment operating "like new"?

Let's face it! Keeping equipment operating like new depends among others on three very important items: (1) lubricating with the proper lubricants, (2) using the proper quantities, and (3) lubricating on schedule.

To provide the proper lubricants, Texaco regularly works with the manufacturers and operators of all types of mining equipment.

Texaco Olympian Grease, for example, was developed for mine car wheel bearings to assure fast, easy starts—every time. It resists stiffening at winter temperatures—resists thinning out in heat. It stays in the bearings under adverse conditions, giving long-lasting protection against dirt, moisture and wear.

Furthermore, *Texaco Olympian Grease* resists oxidation, doesn't separate in storage. And it is available in three consistencies to fill every plain, cavity or antifriction bearing requirement.

Lubricant qualities like these can keep both new and old equipment operating efficiently longer. Ask your Texaco Lubrication Engineer to help you choose the best lubricants for your equipment. Ask him, too, to help you draw up a lubrication schedule that will include data on the quantities needed. Call the nearest of more than 2,000 Texaco Distributing Plants in the 48 States or write:

The Texas Company, 135 East 42nd Street,
New York 17, N.Y.



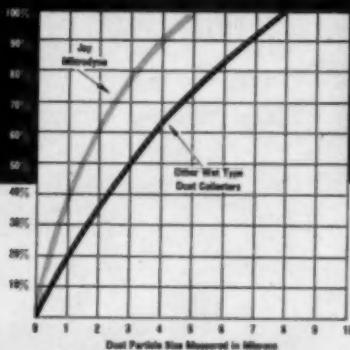
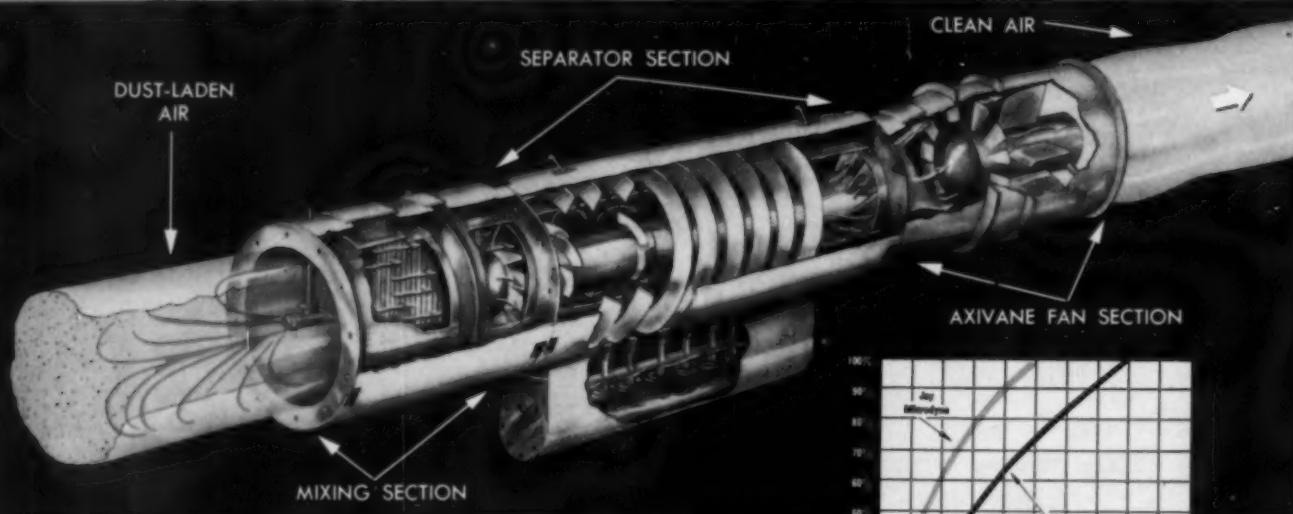
TEXACO MULTIFAK—one grease for many jobs—provides simplified lubrication of anti-friction and sleeve bearings on continuous

miners, loaders, cutting machines and other equipment. A lithium base grease, it assures extra protection against water, dust and dirt.

LUBRICANTS for the Coal Mining Industry

IT'S NEW!

THE COMPACT, HIGH EFFICIENCY
JOY MICRODYNE
DUST COLLECTOR



Fits into existing ductwork, often right at point of use.



There is a Joy Microdyne model designed to meet the special conditions of the application.



Self-cleaning impingement unit is easily removed. Power requirements are unusually low.

1/10 to 1/20 THE SIZE OF ANY OTHER DUST COLLECTOR

Here's a new, wet-type dust collector with an efficiency rating of over 99% down to 5 microns, yet so small and compact it fits where no other collector could. Your own maintenance crew can bolt it easily into existing ductwork, often right where dust originates. Air-borne dust particles, drawn into the mixer section by a Joy Axivane fan at the rear of the collector, are entrained by water after impact on an impingement element.

Dust encased in water droplets passing to the second section are directed by centrifugal force to the wall of the cylinder, thence to a sump below, where the slurry can be pumped or drained away. Low power and water requirements result in unusually low operating cost. **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** **In Canada: Joy Manufacturing Company (Canada) Limited, Galt, Ontario.**

LOWEST COST PER CFM FOR THESE TYPICAL APPLICATIONS

- Metal scale in steel plants and foundries
- Air-borne sand in foundries
- Cleaning air contaminated in mining operations
- Coal dust at screening and drop-off points
- Wherever crushing or grinding operations occur
- Recovery in Uranium mining
- Explosive dust in grain elevators or flour mills
- Dust from granite quarrying and finishing
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Write for FREE
 Bulletin JB-616 or
 FREE Dust Test

Get this descriptive bulletin or let a Joy Engineer take dust samples at your job site for plant analysis.

ADDRESS DEPT. 184-1



JOY MANUFACTURING COMPANY
 EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

**This Month
in**

Coal Age

CONTINUED

life and smooth, safe operation, belts must be properly installed, maintained and inspected. Belt service records provide an accurate picture of a belt's performance and supply data for developing costs. An active fire-prevention program must be implemented and rigidly enforced to guard against costly fires.

Highlights—A 12-point program for effective fire prevention; check charts for good installation and safe operation.

► **Deep Mining**

**Take The Guess Out of Bolting
a Roof** p 80

Daniel C. Shewmon

Author Shewmon attacks two problems of roof bolting—proper bolt length and proper installation torque. Remove the guess of how long a bolt should be, says the author, and the result will be not only safer support but less costly support because the longer bolt is not always the safer bolt. To remove the guess Mr. Shewmon proposes the application of modern industrial engineering techniques, including time studies.

Highlight: An idea for a shear type roof bolt designed with a pre-set torque.

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The Coal Commentator

Kilowatt Problems

Future growth in the Nation's electric power needs will require a vigorous program of engineering and research dedicated to solving problems connected with that growth. In a speech at the Ohio State University, Philip Sporn, president, American Gas and Electric Corp., put it this way:

Electric power needs will rise from a little more than 600 billion kwhr in 1956 to about 2,000 billion kwhr in 1975. Energy to produce 1975 power will come from hydroelectric, 250 billion kwhr; natural gas, 200 billion kwhr; oil, 90 billion kwhr; nuclear, 140 to 200 billion kwhr; and coal, 1,260 to 1,320 billion kwhr. By 1975 this means that some 475 million tons of coal—three times present usage—will be needed to make two-thirds of the Nation's total electric power requirements.

To realize this vast growth, problems that must be solved involve intensive geological work to develop a more accurate inventory of fuel resources, better fuel-burning systems which include the elimination of air pollutants, and improved generating and transmitting equipment.

"As the electric giant grows, the technology for harnessing him will increase in amount and complexity."

Amphibian Float Train

West German firms say they have come up with a completely new type of amphibian float train which will cut costs in transporting bulk loads. Lower costs are achieved through reduced unloading time in shore-to-ship and ship-to-shore transfers and through elimination of losses from crushing which occur when materials like coal come into direct contact with crane grippers. Also important, the shape and size of the float can be easily adapted to channel, contour and depth characteristics of waterways.

The Westphal float train, named after its inventor, Dr. Eberhard Westphal, consists of a front and rear part containing motor and operator facilities, between which there are a number of tubular steel load carriers. The amphibian load tubes can be easily de-coupled and then—still loaded—transported individually by rail or other means to their destination.

Mining Guide

Scheduled for mailing to *Coal Age* subscribers on or about July 19 is a complete reference on modern coal mining. Including the Buyer's Directory, the third edition of the Guidebook (mid-July issue) contains 245 pp of editorial material—about one-third more than last year.

Editorial content has been expanded to incorporate the latest data on current mining prac-

tice and equipment developed by staff writers in traveling some 75,000 mi since the mid-July 1956 issue. Of timely importance, three new sections have been added: (1) on production control, (2) on continuous mining and (3) on training of mine supervisors and employees.

Whether you seek to improve present operations or have mining problems to solve, keep the Guidebook handy for reference throughout the coming year.

Export Note

Overseas coal shipments are pushing toward a record 55-million ton total this year. But increasing dollar shortages abroad will tend to brake the momentum of the export boom.

Argentina, for example, has reported plans to shift its coal purchases from the U. S. to Poland because of a tight dollar situation. The South American republic is now negotiating for 100,000 tons of Polish coal with 500,000 tons a year as the permanent arrangement. (In 1956, Argentina imported nearly all of its coal—1,512,436 tons—from the U. S.)

Your commentator last month drew attention to the leveling off in Europe's energy imports likely to follow Euratom's plan for expanded nuclear generating capacity. A major factor here is to ease the strain on Europe's balance of payments.

Also in the European picture, France's A.T.I.C. in N.Y.C. makes no bones about the current and future pinch on dollars for U. S. coal purchases.

The upshot: high-level exports will continue for the indefinite future but overseas fuel competition will increase. As a result, the export trade must gear up efforts to keep overseas customers sold on the advantages of using quality American coals to fill out their energy needs.

Small-scale Research

"If a company can't spend at least \$100,000 a year for 5 yr, it can't afford its own research department," a prominent research consultant says. This, however, is no stumbling block to small-company participation in the Nation's billion-dollar research effort.

For companies which cannot afford to set up their own research facilities, the American Institute of Management points to the independent research foundations and laboratories where anyone can have a product tested or problem solved. The AIM has published a study listing the names of such institutions, describing how they operate and citing sample costs.

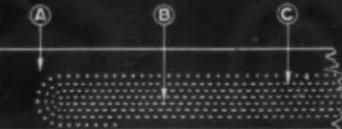
Interested companies or individuals may obtain copies of the study by writing to the American Institute of Management, 125 E. 38th St., N. Y., 16, N. Y., at a cost of \$1 each.



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G.T.M. - Specified

Rayon Coal-Flo Conveyor Belts



- A** Tough, thick cover of acid-resistant rubber
- B** Pliés of superstrong rayon fabric
- C** Rubber skim coat between plies increases flex-life

Saved by the belt: \$750 to \$1,000 a year

PREVIOUS BELTS were always problems: They stretched excessively. They spilled coal. Fasteners constantly pulled out. Breakdowns were frequent. And one belt failed completely in only a year and a half.

Then this Tennessee mine tried a Coal-Flo belt of super-tough rayon. It's muscled to stand up under rough, tough mine service—designed for excellent troughability.

Results were spectacular: Spillage was virtually

eliminated. Repair needs shrank. In fact, this Goodyear belt has now been in service a near-record 9 years—looks as if it might last 9 years more. *And maintenance savings average \$750 to \$1,000 a year!*

Looking for a belt that can do as well in *your* operation? Just check with the G.T.M.—Goodyear Technical Man. You can reach him—*fast*—through your Goodyear Distributor. Or write: Goodyear, Industrial Products Division, Akron 16, Ohio.

COAL-FLO BELTS by

GOOD  **YEAR**

THE GREATEST NAME IN RUBBER

Coal-Flo—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

IT'S SMART TO DO BUSINESS with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."



Heavy-duty switch stand for today's haulageways

This is the Bethlehem Model 1222 switch stand. It was designed especially for use with heavy rails weighing 65 lb and over. The illustration shows the Model 1222 at work in a brand-new track layout designed by Bethlehem and built with 85-lb rail.

Although the 1222 is muscular and tough, it is unusually compact. In fact, it has the amazingly low overall height of 4 1/4 in., making it ideal for confined locations. You can even install it between switch points if conditions are that crowded.

This stand works on the sliding-block principle, which develops powerful leverage and makes the stand easy to throw. There are only three moving

parts: the lever, the crank and the sliding block. None of these parts is located below the base of the stand; thus the mechanism stands clear of ballast and roadbed.

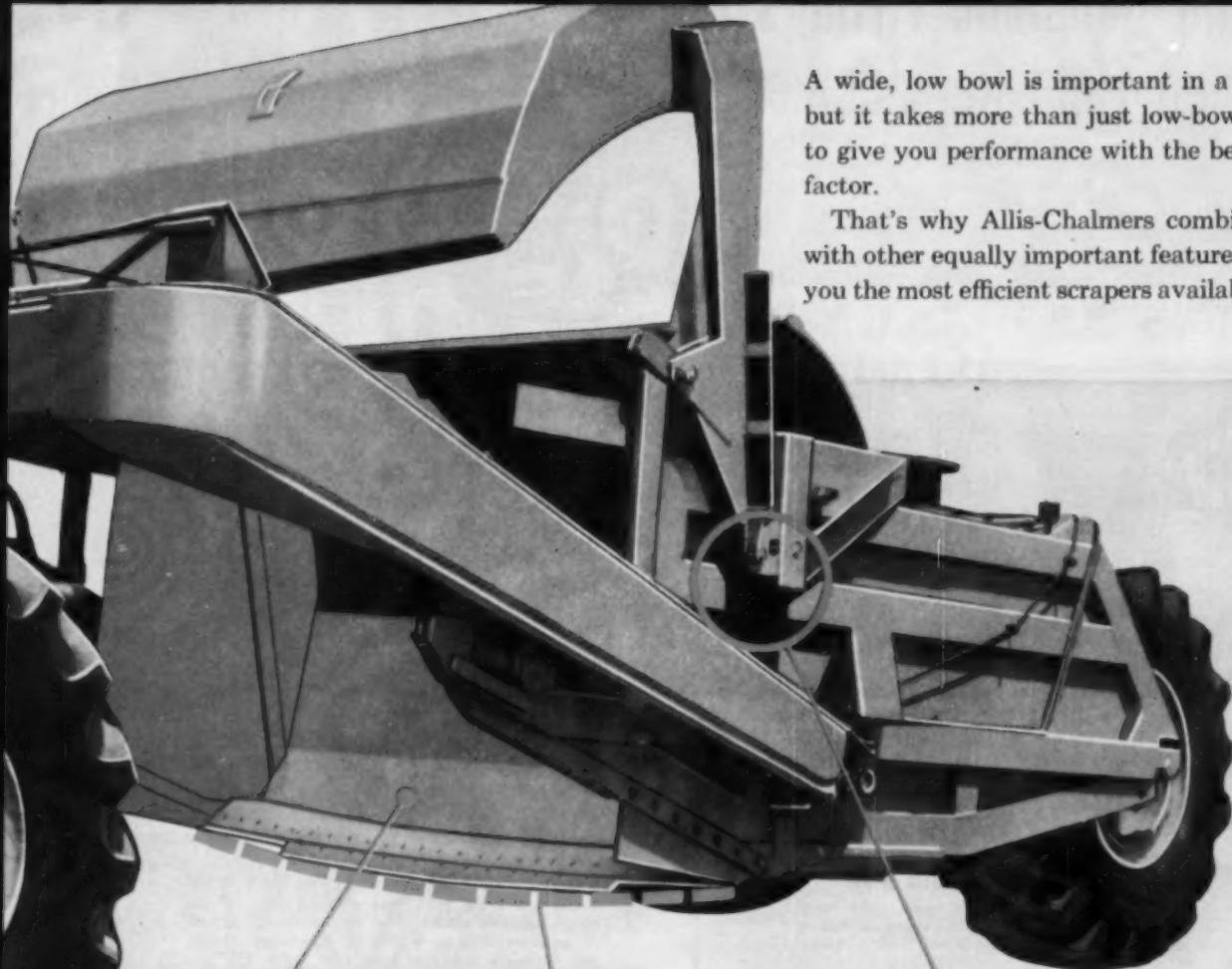
The Model 1222 can be used in connection with a standard rigid rod, or with Bethlehem's No. 11 SFU spring rod, as shown above. It can be furnished with special crank to carry standard target lamp or target only. A Bethlehem engineer will be glad to explain this stand in detail at your convenience.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation, Export
Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



The Low-Down on Low-Bowl Scrapers



A wide, low bowl is important in a scraper, but it takes more than just low-bowl design to give you performance with the best profit factor.

That's why Allis-Chalmers combines this with other equally important features to give you the most efficient scrapers available.

CHECK THIS PROFIT-BUILDING COMBINATION:

1.

Low, wide-bowl design for fast, heaped loading.

2.

Curved bowl bottom and offset cutting edge for faster, easier penetration and live, boiling loads that fill every corner of bowl.

3.

Patented apron-ejector linkage combines high apron lift with positive, forward forced ejection—permits either quick, complete dump or smooth, even spreading.

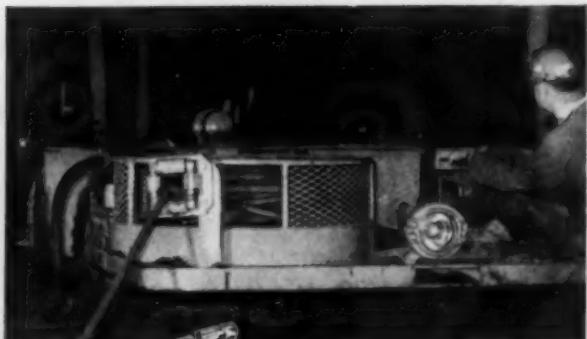
Your Allis-Chalmers dealer will be glad to discuss these and many other profitable advantages with you. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

Engineering in Action

Aeroquip Bulk Hose and Reusable Fittings Speed Field Replacement

Make all your replacement lines quickly, easily, with Aeroquip Bulk Hose and Reusable Fittings. Just cut the length of hose needed and attach the fittings using ordinary shop tools. A few coils of Aeroquip Bulk Hose and some reusable fittings are all you need to replace hose lines on all kinds of mining equipment. Call the Aeroquip Distributor listed in your local Yellow Page Directory.



Aeroquip Hose Lines are made to withstand the abrasion, shock and rough usage in the mine.

SELECT THE HOSE THAT FITS YOUR NEEDS

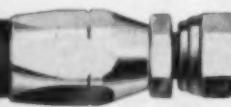
OQUIP 1503



MEDIUM PRESSURE COTTON COVERED HOSE

Single wire braid 1503 Hose with oil and mildew resistant cotton braid cover is recommended for hydraulic lines up to 3000 psi. Ideal for fuel, oil, air and water lines, too. In sizes from $\frac{1}{4}$ " to $2\frac{1}{2}$ ".

OQUIP 1509



HIGH PRESSURE HYDRAULIC HOSE

Double wire braid 1509 Hose with tough rubber cover is recommended for all high pressure hydraulic lines up to 5000 psi., depending on size. In sizes from $\frac{1}{4}$ " to 2".

SELF-SEALING COUPLINGS

Aeroquip 5100 Self-Sealing Couplings connect and disconnect hydraulic, fuel, oil and air lines quickly, with no loss of fluid or inclusion of air or foreign matter into the system. Valve faces are easy to clean. Sizes $\frac{1}{4}$ " to $1\frac{1}{4}$ ".



2759

COAL SHOOTING PNEUMATIC HOSE

Multiple wire braid 1509A Hose with synthetic armorte cover (or 2759 Hose with perforated rubber cover) is especially designed for coal shooting operations. Standard $\frac{3}{8}$ " size with male flare fittings.

2651 AEROQU

MEDIUM PRESSURE RUBBER COVERED HOSE

Single wire braid 2651 Hose with abrasion, oil and mildew resistant rubber cover. For hydraulic, oil, fuel, air and water lines up to 3000 psi. No skiving is necessary. Fittings fit right over hose cover. $\frac{1}{4}$ " to $2\frac{1}{2}$ ".



EQUIPMENT MANUFACTURERS

Write for Catalog No. 201
for full information on
Aeroquip products plus
helpful engineering data.

**Aeroquip**
REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 10, ONTARIO

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

BIG CAR STRENGTH IN THESE GOODMAN



SHUTTLE CARS FOR LOW COAL... AC or DC



These cars have all the structural strength expected only in big shuttle cars. Wheel units, gear reducers, electrical control parts, conveyor chain and flights are counterparts of those found in the big, rugged Goodman cars—some are even interchangeable. The frame of the cars, including side plates, is a welded, one-piece unit reinforced with heavy cross members. The

conveyor pan is made of $\frac{3}{8}$ " steel plate on the 26" car, $\frac{1}{2}$ " on the 32" car. Conveyor chains are extra strong and are made to accommodate pull-out type flights. Reversible chain drive is available.

The two traction motors on each car, and the conveyor and hydraulic pump motor are 10 hp. All have high continuous rating and all use identical and interchangeable motor shells and armatures. Loaded running speed is 4 mph.

Water level full capacity of the 26" car with 45° discharge end extension is 90 cu. ft.; of the 32" car it is 114 cu. ft. Capacity of the 32" car can be increased to 175 cu. ft. with the addition of 8" sideboards. The cable reel is hydraulically controlled for winding and unwinding from bottom position.

Standard Goodman features, of course, include 4-wheel power steering, 4-wheel disc type brakes, 4-wheel positive drive, dual control in operator's cab, adjustable height discharge, U.S. Bureau of Mines approval.



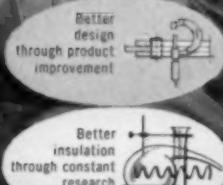
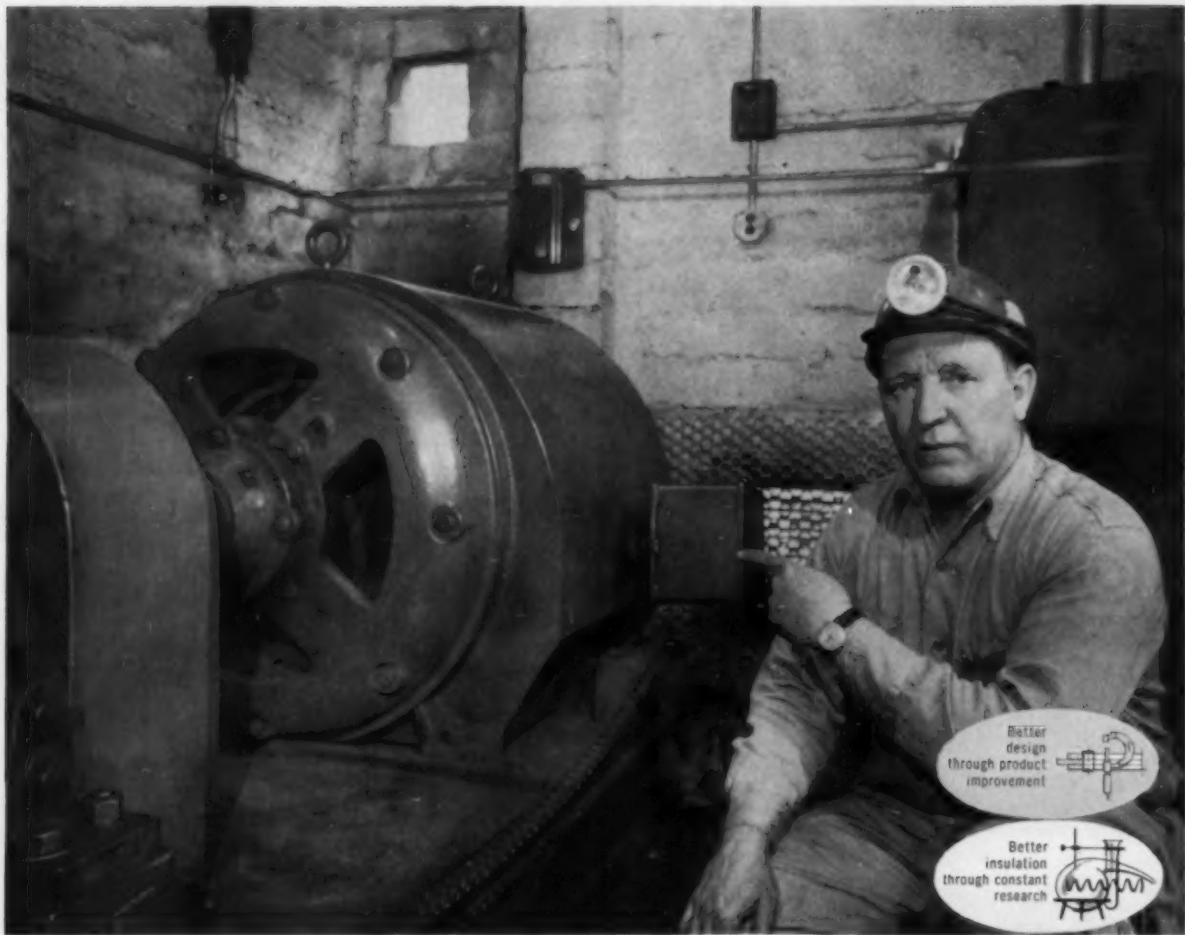
A Goodman pair to complement Goodman low vein shuttle cars—the Type 2400 for fast cutting, the Type 965 or 966 loader for high capacity loading. For AC or DC operation.



GOODMAN
MANUFACTURING COMPANY
Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts



These motors mean life for 156 men underground

Louis Allis motors provide unfailing drives for mine fans exhausting explosive and poisonous gases

Here's a performance record that's hard to beat — not a single mine shutdown due to exhaust-fan power failure since the installation of two Louis Allis 200-hp motors in 1951.

"These motors have been operating day-in, day-out on a round-the-clock basis — without failure, breakdown, or maintenance — for the past six years," reports the mine superintendent of a prominent West Virginia coal mine.

That's pay-off performance where it's really needed. Even a short interruption in service might permit the formation of poisonous or explosive gas pockets. At best this would mean shutting down the mine, a

safety test, and a complete recycle of fresh air before the men could re-enter. This recycle period incurs a production loss that might equal \$1000.

Louis Allis drip-proof motors provide the same reliable, trouble-free service regardless of application. Louis Allis features include moisture- and corrosion-resistant cast-iron housings and special varnishes, rigid end brackets, and locked bearings. They are properly lubricated and ventilated for long life.

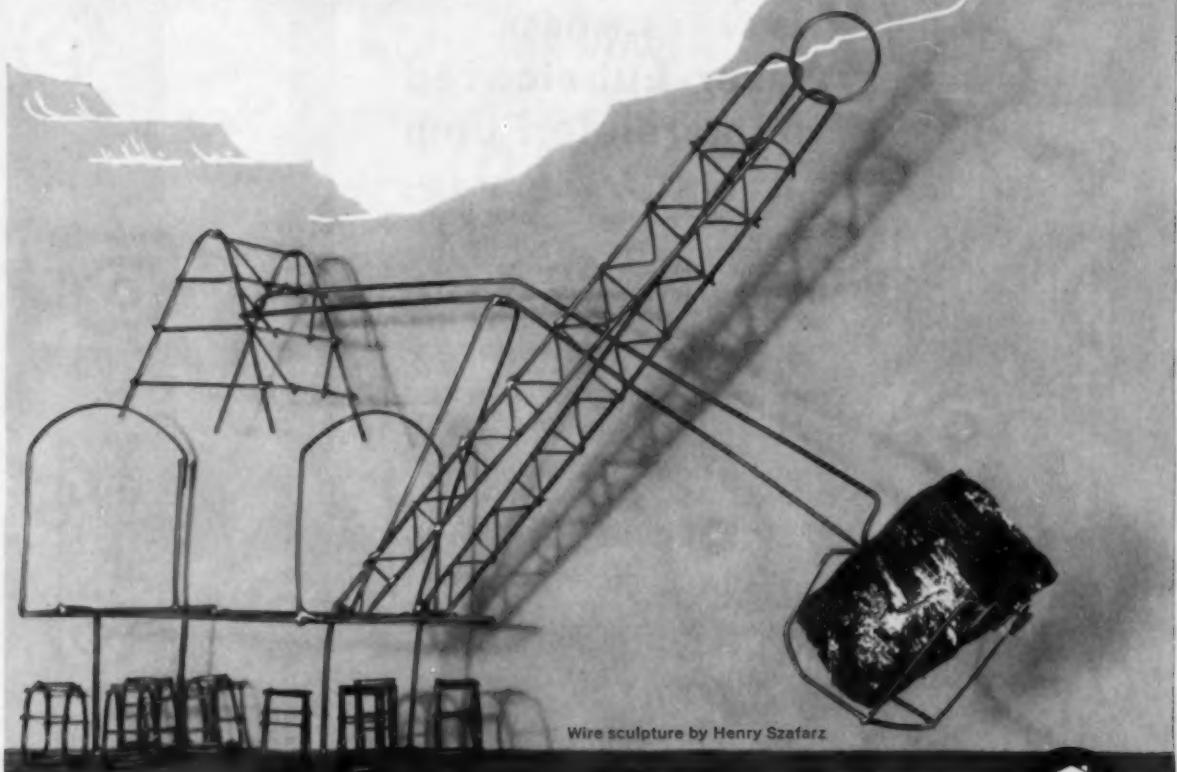
Investigate these and Louis Allis Bureau-of-Mines-permissible motors for underground installations. Contact your Louis Allis District Office or write The Louis Allis Co., 441 E. Stewart St., Milwaukee 1, Wis.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

Every Bite is a Payload

The effective use of power equipment is the very essence of successful mining operations. And everywhere that power is used in mines, you'll find Simplex-TIREX cords and cables on the job. These expertly engineered cords and cables, newly improved for greater flexibility, feature cured-in-lead Neoprene Armor that resists abrasion, oil, heat and water... gives longest life. **SIMPLEX WIRE & CABLE CO.,** 79 Sidney Street, Cambridge 39, Mass.



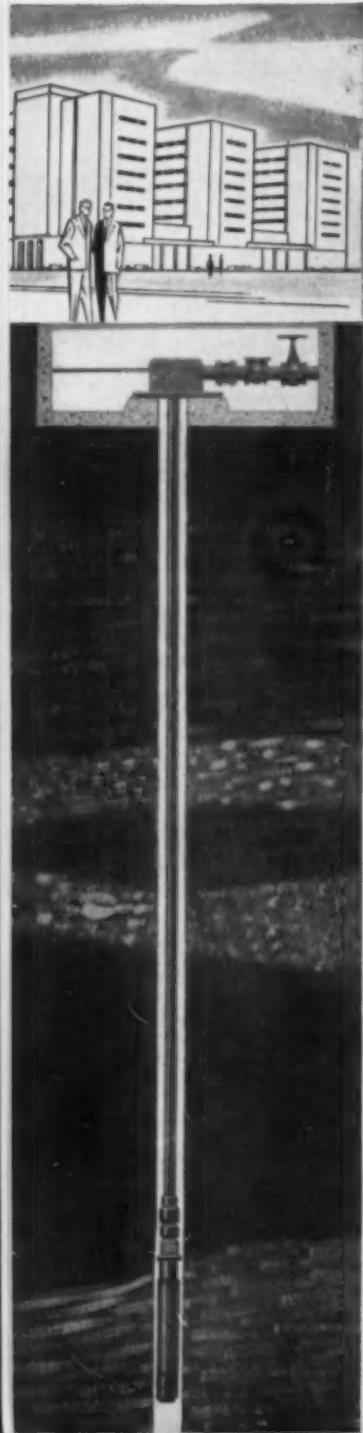
Wire sculpture by Henry Szefarz



Simplex
TIREX



Now you can bury your pumping problems



FAIRBANKS-MORSE Water-Lubricated Submersible Pump

Now you can have all the advantages of a submersible pump, plus time- and performance-tested Fairbanks-Morse features.

Fairbanks-Morse submersible pumps permit well location anywhere that a well can be drilled. No unsightly installations, no costly pump housing. Nothing—absolutely nothing—need show above ground. These pumps submerged in the well below water level are practically soundless and require no line shafts, packing boxes or lubrication devices. Hence, wearing parts needing maintenance are reduced to a minimum. A single moving assembly does all the work.

Installation is faster and more economical. The Fairbanks-Morse motor, with lifetime Copperspun rotor cooled by water and lubricated by water, gives full motor output. The well-known Fairbanks-Morse or Pomona pump bowls are combined with these wet stator motors to produce unbeatable pumping units covering a wide range of requirements as to volume, pressure, and setting depth.

For industry or community service you can place your water service trust in the F-M submersible. Contact your Fairbanks-Morse Sales Engineer and ask him for Bulletin 6910 on this time-proved submersible pump, or write today to Fairbanks, Morse & Co., Dept. CA-8, 600 S. Michigan Avenue, Chicago 5, Illinois.



FAIRBANKS-MORSE

a name worth remembering when you want the BEST

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY
RAIL CARS • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

HERE'S WHY THOSE WHO KNOW
PREFER THE *Lee-Norse MINER*



PATTERN CUTTING—only Lee-Norse has it.

CUTS MORE COAL WITH LESS POWER . . . cutters revolve and oscillate at the same time—mill the coal from the face.

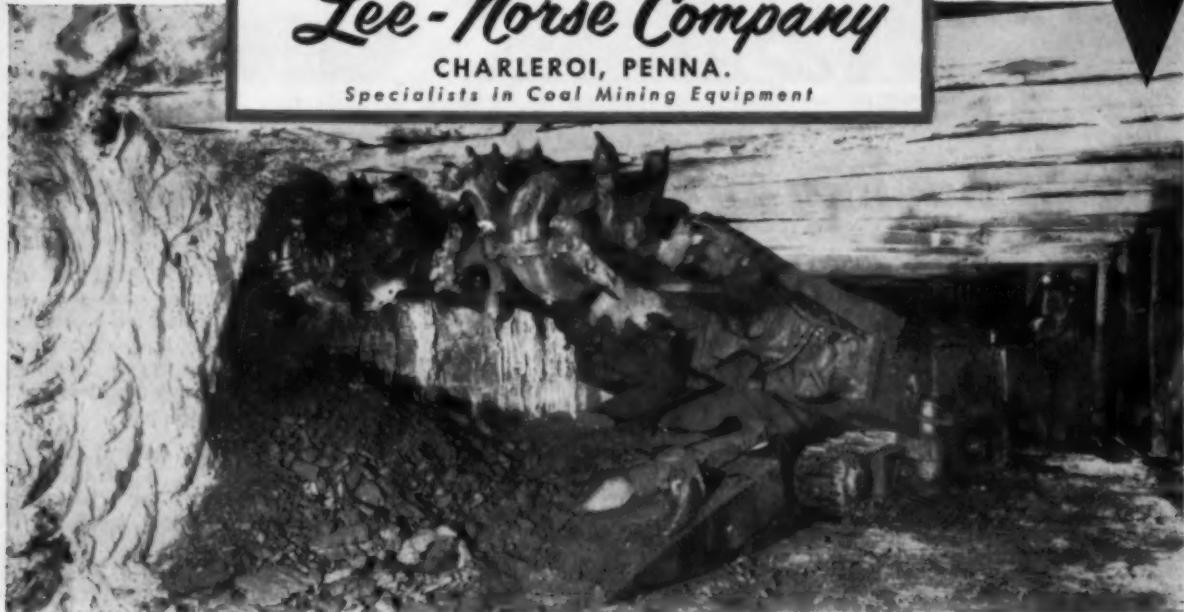
CUTS A COARSE PRODUCT—FEWER FINES . . . cutter bits follow a right and left spiral direction producing a diamond pattern which breaks off in coarse cuttings.

A SIMPLE, STURDY MACHINE . . . essentially a modern loading machine on which is mounted a set of efficient cutting heads.

HIGHLY MANEUVERABLE—FAST TRAMMING . . . not a "muscle-bound giant" . . . it quickly follows any variation in seam thickness.

EXCELLENT CLEAN-UP . . . improved dual gathering arms load all the coal into a flexible rear conveyor.

Lee-Norse Company
CHARLEROI, PENNA.
Specialists in Coal Mining Equipment





Tough hauling problem? Take a look at

If heavy loads, rough roads and steep grades, *with little or no turn-space*, are part of your hauling problems, then you'll find some answers in Koehring Dumptor. Come along on a typical load-haul-and-dump cycle:

There's no slow jockeying back and forth at the loader. Dumptor spots into position fast — is loaded over the sides, or over either end. Wide-flared 6-yard body, with low height, provides a big square target — 64 square feet, to be exact. This

reduces spillage, steps up output of shovel, dragline, clamshell, or tractor type loader — adds extra trips to daily production.

On the haul, Dumptor accelerates fast, pulls through soft ground with less shifting — climbs 24% ramps or grades fully loaded. It has better than 6 H.P. of "go" for every ton of loaded weight. Narrow haul roads, ledges, tunnels, overhead ramps and trestles are no problem. *There is no need to turn*, because Dumptor operates with equal ease

and speed in either direction. It gets this unique *no-turn shuttle-haul* advantage through a constant-mesh transmission that gives the same, fast, 3-speed travel forward and backward. Every turn saved cuts 15 seconds off cycle-time.

At the dump area (above), *gravity* tilts the body, dumps the load in one second. No 15 to 25-second wait for slow-acting mechanical body-hoist — no hoist maintenance. *Gravity-dump* never balks — never wears out. Heavy-duty Dumptor

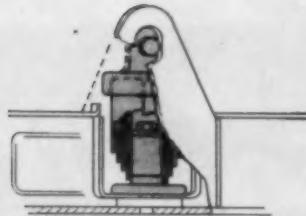


Dumptor® . . .

also has a ton of strength for every ton of payload capacity. Sides, ends of body are rib-reinforced. Double-plate bottom is lined with multiple steel beams. Check its other advantages at right — then ask Koehring distributor to demonstrate what Dumptor can do on your heavy, off-road hauling. Call him *today*.

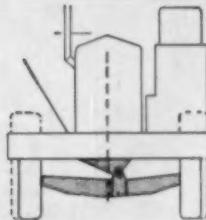


KOEHRING
DIVISION OF KOEHRING COMPANY
MILWAUKEE 16, WISCONSIN 53266



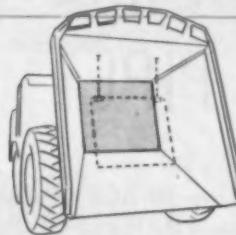
HEAVY-DUTY CHASSIS SPRING

Dumptor has just one chassis spring — a heavy snubber-type, mounted between main frame and steering axle. No leaf springs. Big shock-absorbing drive tires eliminate springs and spring maintenance on drive axle.



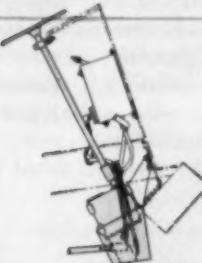
OFF-SET PIVOT ON AXLE

Pivot point on steering axle is offset from center line $3\frac{1}{4}$ " toward operator side of Dumptor. There's no sag, even with unbalanced loads. Steering axle oscillates up to 21", helps keep twisting strains out of main frame.



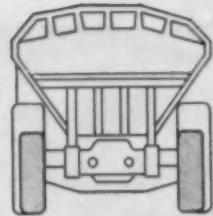
BOLTED OR FREE-SWINGING PAN

Heavy steel kick-out pan is $\frac{1}{2}$ " thick. Pan can be bolted to body floor for extra protection when loading rock. Remove bolts, and pan has swinging kick-out action . . . breaks load suction when dumping wet or sticky materials.



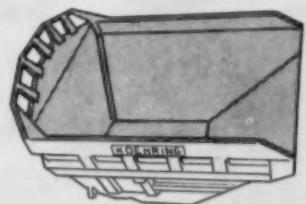
HYDRAULIC POWER-STEER

Power steering adds to Dumptor maneuverability for fast spotting, lets driver handle off-road travel with ease. Dumptor has a short turning radius of only $19'-3"$, far less than other haulers of comparable capacity.



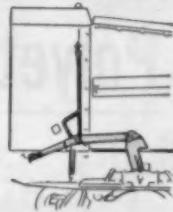
TIRES TRACK IN DIRECT LINE

Wide, heavy steering axle puts Dumptor steer wheels in line with drive wheels. Tires track in the same path. There's less rolling resistance, better traction in soft ground, on loose stockpiles and over rough haul roads.



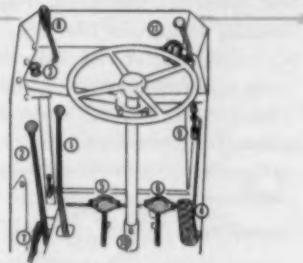
STREAMLINED ALL-STEEL BODY

There are no bulges or ledges inside the body. Top edge is box beam construction. Sides and ends are ribbed with 5 and 8-inch channels. Bottom is lined with multiple steel beams. Sturdy ridge bar joins rock guard teeth.



SIMPLE BODY LATCH

Body latch for 1-second gravity dump is simple and trouble-free. Latch is engaged by a single hook mounted on the chassis frame. Dump lever is located inside cab in an easy-to-reach position for quick effortless dumping.



EASY-REACH CONTROLS:

(1) speed gear shift, (2) directional gear shift, (3) starting aid, (4) foot throttle, (5) clutch pedal, (6) brake pedal, (7) parking brake, (8) body release lever, (9) hand throttle, (10) light control switch, (11) Controller.



What does mine water do to USS NATIONAL* Polyethylene PIPE?

Nothing. In spite of its ravenous corrosive properties, mine water has no effect on NATIONAL Polyethylene Pipe. That's why it's the perfect pipe for mine drainage systems. However, polyethylene pipe offers more than resistance to acids, alkalis, salts and other chemicals. It offers economy and speed of installation. Light and flexible, it unrolls like hose, turns corners, goes over and under obstructions, requires very few joints.

NATIONAL Polyethylene Pipe is tough. It takes rough handling without cracking, even at sub-zero temperatures. In fact, it stays tough and

flexible over its entire working range from minus 90°F. to plus 120°F.

In addition to all the advantages it offers, NATIONAL Polyethylene Pipe is the *most economical* pipe that can be effectively used for mine drainage.

Manufactured from *pure 100% "on grade" polyethylene raw material*, NATIONAL Polyethylene Pipe is available in sizes from $\frac{1}{2}$ -inch to 6 inches in diameter, in a variety of wall thicknesses. For complete information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

*Trademark

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION
PITTSBURGH 30, PA; UNITED STATES STEEL EXPORT COMPANY, NEW YORK



NATIONAL Polyethylene PIPE

UNITED STATES STEEL

This seal of the National Sanitation Foundation is carried on all USS National Polyethylene Pipe and means—Tested...Approved...Sanitary!



**National Mine
Service Company**



**New Convenience
and Economy for users of**

Clarkson* "Redbird" Conveyor Chain



Clarkson "Redbird" Conveyor Chain, standard of the industry for economy and durability, is now stocked and distributed in all major coal fields by National Mine Service Company. The regularly scheduled truck deliveries which established the National Mine reputation for service will now bring you Redbird chain—already assembled in lengths for convenient handling.

To gain maximum strength and balanced construction, Clarkson Redbird flights and flight

pins are welded together—forming an integral unit. This type of construction also facilitates replacement, since it is necessary only to break the cottered chain and insert the new flight assembly. Longer chain life, reduced downtime, less adjustment and fewer replacements make Redbird the most economical chain available.

Your National Mine representative will be glad to show you how Clarkson Redbird can reduce your chain costs.

*Clarkson Manufacturing Co., now Clarkson Division of National Mine Service Company.

National Mine Service Company

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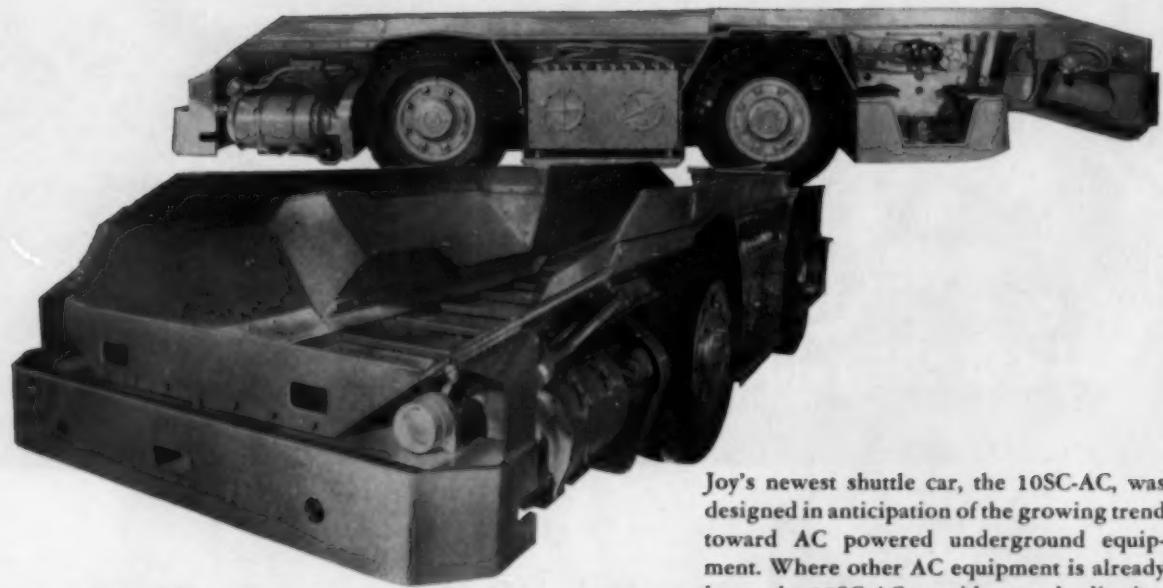
Western Kentucky Division
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JOY 10SC-AC

SHUTTLE CAR



The 90 HP 10SC-AC takes full advantage of 5 AC motors... motors which are characteristically trouble-free. Complex transmissions, torque converters, complicated gearing, numerous clutches and other potential problem spots are eliminated. Result: minimum maintenance and minimum down-time.

Joy's newest shuttle car, the 10SC-AC, was designed in anticipation of the growing trend toward AC powered underground equipment. Where other AC equipment is already in use the 10SC-AC provides standardization of power supplies throughout the mine... makes stocking and purchasing problems simpler. But more important, the 10SC-AC brings the powerful performance and extremely low maintenance of AC motors into the shuttle car field for the first time.

Two constant-horsepower, 2-speed traction motors, rated at 25 horsepower each, drive the car... eliminating all clutches, transmissions, and cross-drive shafts. Shifting is done automatically, electrically... fewer mechanical parts... less maintenance. Two constant-torque, 2-speed conveyor motors, 10 horsepower each, power the conveyor by direct drive without complicated transmission systems or complex gearing. These design features closely follow the proved design of Joy's DC driven car, the 10-SC, operating in the field for almost ten years.



4-wheel drive and 4-wheel steering makes the 10SC-AC extremely maneuverable in closely timbered areas.

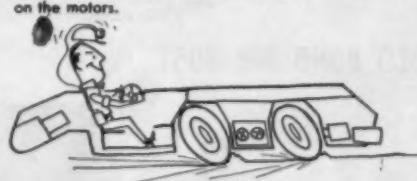
DESIGNED SPECIFICALLY FOR AC OPERATION



The Joy 10SC-AC car easily carries 10 tons of material even on rough bottoms.



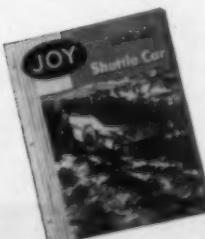
LESS MAINTENANCE—Alternating current motors are trouble free—no servicing of brushes, brush holders and studs . . . not even hand holes on the motors.



REGENERATIVE BRAKING—Standard equipment on the 10SC-AC. On down-grade, braking automatically occurs when motors are driven over their synchronous speeds.



SAME SPEED LOADED OR EMPTY—AC motors power the 10SC-AC at almost the same speed whether loaded or empty . . . keeps several cars on an even cycle . . . eliminates jams and waiting at loading point.



WRITE FOR BULLETIN 144-1

A complete description of the 10SC-AC including dimension drawings, specifications and performance curves.



PROVED PERFORMANCE—The basic design of the car is the Joy 10-SC . . . in the field since 1948. New 10SC-AC's are now working coal.

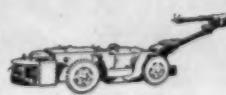
JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH, PA.
EQUIPMENT FOR MINING . . . FOR ALL INDUSTRY



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GOLD BOND AIR HOSE...



built to take abrasion, abuse and heavy duty service.



Write today for more information and literature.



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PYROPRENE* CONVEYOR BELTING...



fire resistant...oil resistant...mildew proof.

*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-7" January 27, 1956

RUBBER MANUFACTURING CORP.

TRENTON 3, N. J.

A Division of Acme-Hamilton Manufacturing Corporation

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HIGH IN

P & H

ELECTRICS

ARE WORKING FOR SOUTHERN PERU COPPER

In their operations as high as 13000 feet in the Peruvian Andes at Toquepala, Peru, Southern Peru Copper is using P&H Electric Shovels. Their maximum availability and minimum maintenance are vital to high production. In addition to 10 P&H Model 1800 machines, Southern Peru Copper has purchased 23 P&H diesel powered excavators.

Only P&H Electric Shovels have these outstanding exclusive features.

MAGNETORQUE®... the electro-magnetic type coupling that transmits power from the hoist motor to the dipper for faster action, eliminating shock and impact to the hoist gear train and motor. Response is immediate to varying load conditions.

ELECTRONIC CONTROLS... providing the fastest action of any type of control available on electric shovels. All motions are smoother, resulting in consistently higher output.

Whether it's big P&H Electric Shovels from 3½ through 8 cu. yds., or smaller P&H excavators, it will pay you to choose from the P&H complete line. P&H offers single source responsibility for all your open pit mining needs.

HARNISCHFEGER

CONSTRUCTION & MINING DIVISION
Milwaukee 46, Wisconsin



THE ANDES



ONLY REPUBLIC CERTIFIES

EVERY MILL SHIPMENT IS CERTIFIED by an individually filled-out Republic Mine Roof Bolt Material Control Certificate. Specific performance characteristics are shown for the heat, or heats, of steel used in the particular order. Consistent top quality is assured.



REPUBLIC OFFERS ALL FOUR major classifications of mine roof bolt assemblies. Types shown are forged wedge head bolt, developed by Republic, and square head bolt with wedge nut and rigid expansion shell.

REPUBLIC



World's Widest Range of Standard Steels

ROOF BOLT PERFORMANCE

to guarantee consistent top-holding strength

Now, when you specify Republic, you get positive proof of reliability in every mine roof bolt you receive. Republic, alone, provides written evidence—in the form of the Mine Roof Bolt Material Control Certificate—showing specific performance characteristics of the steel used in every shipment of roof bolts.

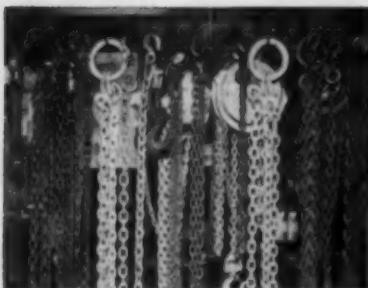
To establish positive identification, each Republic Material Control Certificate bears the number of the mill order it covers. Next, the heat number of the steel used and its yield point in pounds per square inch are given. Finally, yield and break points, in pounds, are shown for the bolt size being supplied.

This information is invaluable in establishing placement patterns and methods, to provide

maximum protection of men and machines in all bolted roof areas. In effect, you get pre-tested roof bolt performance—a major factor in securing better-than-ever roof control.

Republic is able to provide exact performance data, through complete control of all roof bolt manufacturing operations, from raw ore to finished product. In every case, yield and break strengths are guaranteed to meet or exceed Specification ASTMA-306 physical requirements, submitted by The Committee on Roof Action as mining standards. Finally, every Republic Mine Roof Bolt produced is performance certified *at no extra cost* to you.

For the full story on Republic PERFORMANCE CERTIFIED Mine Roof Bolt Assemblies, contact your local Republic office. Or mail coupon.



REPUBLIC PROOF-TESTED CHAIN SLINGS are ideally suited to a wide variety of mining industry handling operations, in production and maintenance work. Republic makes a complete line of welded and weldless chain in many steel analyses, with all necessary fittings and accessories—for lifting, towing, hauling and binding applications. Send coupon for data.



CORROSION RESISTING PERFORMANCE of Republic FE Flexible Plastic Pipe has solved expensive replacement problems in this mine-water-handling system. At last report, Republic had outlasted conventional piping by six to one in terms of time. Moreover, Republic FE is easier to install—and to relocate to meet changing needs. Send for details.



BOLTED ASSEMBLY PERFORMANCE can be no better than the reliability of its fasteners. Because Republic Bolts and Nuts are produced under a coordinated quality control program, from ore to finished product, their absolute dependability is assured. Equipment producers can choose from over 20,000 standard and 8,000 special types and sizes. For facts, mail coupon.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION

Dept. C-4282
3124 EAST 45th STREET, CLEVELAND 27, OHIO

Please send me more information on:

<input type="checkbox"/> Mine Roof Bolts	<input type="checkbox"/> Chain Products
<input type="checkbox"/> Type FE Plastic Pipe	<input type="checkbox"/> Fastener Products

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

- **Keep coal from freezing**
- **Build better customer relations**
- **Speed car turn-around**



Order Sterling Rock Salt now—regular or "Inhibium Treated" for maximum protection against corrosion of metal equipment. Available in bulk or handy 100-lb. bags from International's strategically located mines.

... treat your coal shipments with Sterling Rock Salt

It takes so little time and effort to apply Sterling Rock Salt! Just two to four bags of this effective antifreeze agent will keep an entire carload of coal from freezing. Sterling Rock Salt can be quickly applied, handles easily, is harmless to hands and clothing. It dissolves slowly, to give long-lasting antifreeze action. *Your customers will gladly pay the small premium for coal they can unload without first having to thaw it out.*

You can also use Sterling Rock Salt to prevent frozen scales and switches . . . and to keep roads and yards clear throughout the winter. It removes snow and ice fast.

INTERNATIONAL SALT CO., SCRANTON, PA.

Sales offices: Atlanta, Ga.; Chicago, Ill.; New Orleans, La.; Baltimore, Md.; Boston, Mass.; Detroit, Mich.; St. Louis, Mo.; Newark, N. J.; Buffalo, N. Y.; New York, N.Y.; Cincinnati, O.; Cleveland, O.; Philadelphia, Pa.; Pittsburgh, Pa.; and Richmond, Va.

FOR INDUSTRY, FARM, AND THE HOME—
STERLING SALT
PRODUCT OF INTERNATIONAL SALT CO., INC.

On the scene with the "RIVER QUEEN"



TOWER OF STRENGTH! Sturdy front end of the River Queen rises high above the pit to a height of 140 feet from the ground to the top of the boom sheave.

This new 1650-B stripper is removing overburden, including a 10-ft. ledge of limerock, from two seams of coal at the River Queen Coal Company* mine near Central City, Ky. Equipped with a 145-ft. boom, 86-ft. handle and 55-cu. yd. dipper, it has a dumping reach of 147½ feet and a working range of over 300 feet.

Unique flexibility makes it possible to equip the 1650-B with the most suitable digging combination for a specific need. It is designed and built to handle dipper capacities from 40 to 65 yards, depending on the choice of boom and handle lengths. Dumping reach varies accordingly from 178 to 135 feet.

Here is quality in action — another example of stripping shovel performance in the finest Bucyrus-Erie tradition — combining unique flexibility with range, capacity, speed, and reliability to provide consistently high output at low operating cost. For further information, write us direct.

125L75C

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

*Owned jointly by W. G. Duncan Coal Co. and Peabody Coal Co., and operated by Peabody.

New Bucyrus-Erie 1650-B Stripping Shovel



BOARDING-HOUSE REACH! The River Queen piles earth and rock nearly 300 feet away from the digging point and stacks it more than 100 feet high.



BUILDING MOUNTAINS? Not quite, but with more than 80 tons of rock and earth in each cycle, the River Queen can pile up a "mountain" of more than 100,000 tons in a 24-hr. period.



WHAT AN APPETITE! 55 cubic yards per bite for the River Queen. Flexibility of boom and handle lengths permits the 1650-B to be equipped for 40- to 65-cu. yd. service.

A Familiar Sign

**BUCYRUS
ERIE**

at Scenes of Progress

TRUCKS



when they are
equipped with

EATON 2-SPEED AXLES



Wherever trucks have to go—on or off the highway—Eaton 2-Speed Axle equipped trucks go quicker—and at lower cost per mile. That's because Eaton 2-Speeds provide a right gear ratio for every hauling situation.

To enable truckers to "make time" on the open highway, Eaton 2-Speed Axles provide a HIGH-HIGH ratio—trucks GO at top legal speeds. When POWER is needed on steep grades or to pull out of tough off-the-highway spots under full load, drivers select the LOW-LOW ratio—and GO! This wider choice of gear ratios means reduced stress and wear on engines and other vital truck parts. It means that Eaton 2-Speed Axle trucks keep GOing for many extra thousands of trouble-free miles—they cost less to operate and maintain, and are worth more at trade-in time.

More than Two Million
Eaton Axles in Trucks Today.
For complete information,
see your truck dealer.

EATON

AXLE DIVISION
MANUFACTURING COMPANY
CLEVELAND, OHIO



PRODUCTS: Engine Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Hydraulic Pumps
Motor Truck Axles • Permanent Mold Gray Iron Castings • Forgings • Heater-Defroster Units • Automotive Air Conditioning
Fastening Devices • Cold Drawn Steel • Stampings • Gears • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



How 1 tractor handles all clean-up around fleet of scattered shovels

A large open-pit copper mine in Arizona uses only one tractor for all clean-up around their widely scattered production shovels. It is the 210 hp rubber-tired LeTourneau-Westinghouse Tournatractor®. Here's how this 17 mph tractor operates during a typical 8 hour day:

Averages 10 min. per shovel

When the 6-yd. shovels have completed loading a string of ten to twelve 84-ton capacity rail-cars, Tournatractor drives in and goes to work. Straddling the rails, this rubber-tired tractor efficiently dozes shovel spillage off tracks with its Angledozer* blade. At each shovel, speedy Tournatractor cleans-up

loading area and railroad track in about 10 minutes!

Takes shortest route to next location

When each assignment is finished, Tournatractor operator just flips instant-shift lever and he's on his way to the next shovel. There are no delays for crawling or load-and-haul to new location. A mile is only a couple minutes away! Tournatractor always takes the shortest, fastest route to the next work location... often "runs" down steep "shot" banks to lower benches. Big, low-pressure tires do not damage air-drill hose lines, RR tracks, ties, switches, or haul road surfacing.

At this large open-pit copper mine in Arizona, copper is produced from huge tonnages of rock and ore that are mined each day. Equipped with Angledozer and till mechanism, 210 hp Tournatractor makes quick work of clearing shovel-spillage from railroad tracks.

"You can't beat Tournatractor"
Handling all clean-up work for the shovels... plus completing numerous scattered maintenance jobs during his 8 hour shift... Tournatractor operator said, "You can't beat this tractor for clean-up work. This is the place for rubber... I can move around faster than a pick-up truck on some of our benches."

For more information
If you use several crawler-tractors for clean-up at your pit, plant, and stockpiles, investigate how Tournatractor's power... traction... speed... and "go-anywhere" mobility can pay off for you. We'll be glad to demonstrate Tournatractor at your pit... let you judge for yourself.

*Trademark CT-1482-M-1



Go-anywhere Tournatractor "runs" down a "shot" bank to shorten travel time between shovels. With big, multi-disc air brakes — totaling 3,762 sq. in. of brake surface — operator has sure, safe control at all times.

Crossing tracks, Tournatractor's big, low-pressure tires deflect to prevent damage. They do not loosen rails, damage ties or switches.



LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT



At coal processing plants throughout the nation, Wissco-Loy Screens are the choice for sizing operations. It's because...

...WISSCO-LOY® SPACE SCREENS are economical, yet tailor-made for the job!

There's an easy way to help reduce your cost per ton of material screened—just switch to economical Wissco-Loy Space Screens.

Although they are economical in initial cost, Wissco-Loy Screens offer maximum accuracy because *they are tailor-made to your specific need*. Long-lived? You bet! Wissco-Loy Screens are made from a tough special wire, and every knuckle is carefully crimped to prevent "hidden wear" at the wire intersections.

What's more, Wickwire engineers are always available to help you solve your screening

problems and then to recommend the right screen for your job. Get the whole story right now without obligation. Just contact your nearby CF&I representative or write direct to the nearest sales office listed below.

Need stainless steel space cloth or extra-rugged screens? Your CF&I representative is the man to see for these, too. He can supply a complete line of stainless steel, as well as extra-tough, oil-tempered Super-Tempered Precision Space Screens. Get the whole story from him today!



SPACE SCREENS

THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver
El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland

Pueblo • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Wichita

WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
CF&I OFFICES IN CANADA: Toronto • Montreal • CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

#233



Can your haul units match these advantages?



Before you buy your next off-road hauling unit, make this test to see if you are getting the most for your money. Examine the various makes of haulers in the light of these features — standard on LeTourneau-Westinghouse Rear-Dumps:

Hauls anywhere — With big, low-pressure tires, L-W Rear-Dumps safely haul capacity loads over rutted haul-roads, paved highways, city streets . . . haul cross-country over rough terrain, over rocky pit floors . . . through mud, sand, and over soft fills.

Maneuvers easily — 180° turns — within distance of less than its own length — plus power-steer, quickly positions Rear-Dump under dipper. Time normally wasted by conventional haulers jockeying back and forth to spot at shovel or fill is eliminated. Big, square-type body target speeds loading.

Dumps fast, clean — Flick of an electric switch actuates hoist-motor. Body lifts quickly to any desired angle, for spreading on the run . . . or for dumping over bank. At full-dump position, bowl is behind rear wheels, so dump is clean, doesn't



"bury" wheels. Streamlined body sheds material readily.

Cuts weather delays — Power-transfer differential automatically applies up to 80% of power to drive-wheel on firmest footing . . . pulls unit through mud, sand and soft materials which stop ordinary haulers. Front-wheel drive pulls unit off soft fills readily. Pivot-turn, through geared kingpin, "walks" prime-mover out of soft spots.

Provides maximum safety — Multi-disc air brakes have more wheel braking surface than any other type hauler. Low center of gravity, good visibility, power-steer, front-wheel drive, easy electric controls . . . all contribute to operator's confidence and safety.

Reduce maintenance — Having no hydraulics or jack-lines, no long

drive-shaft . . . no frame, sub-frame, springs or tie-rods . . . these Tournapull® Rear-Dumps are less subject to downtime for maintenance and repairs than any other type hauler. Slant-bottom bowl reduces shock damage when loading large chunks.

Add to all these advantages, the versatility of Tournapull's prime-mover — which can be converted to operate these matching trail units: scraper, bottom-dump, flat-bed, logging arch, or crane. Any of these interchangeable work-units cost about 25% of your original machine investment. You benefit 100%.

Check all the "plus earning advantages" Tournapull Rear-Dumps have to offer YOU! Ask for complete details on the size that fits your needs: 11-ton "D", 22-ton "C", or big 35-ton "B", each a profit-maker.

R-1054-DC-1

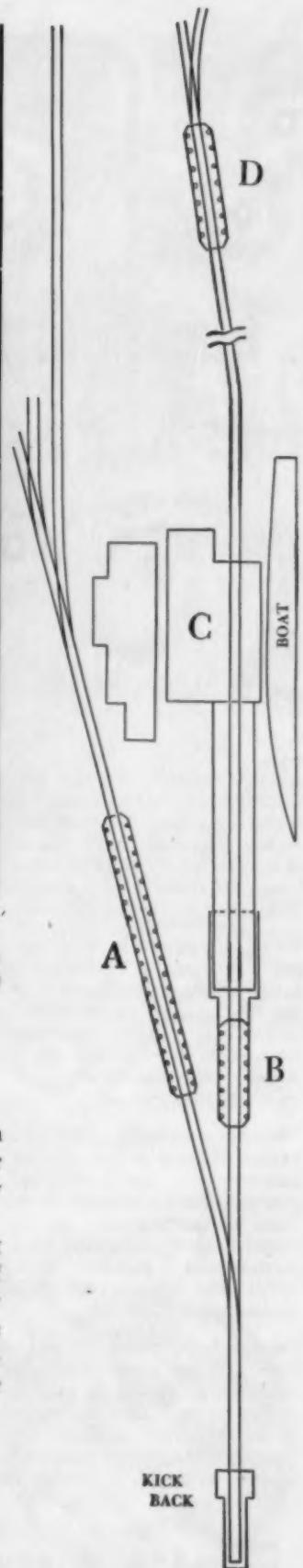


LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

FAST AND EFFICIENT MATERIALS HANDLING—Loaded coal car rolls down the incline on the left at about 15 miles per hour. Its speed is reduced automatically in car retarder (A) so that it rolls up a "kick back" at just the right speed to send it back to retarder (B) where it is stopped automatically. A "barney" then pushes the car up the slope to the car dumper (C) where coal is unloaded directly into the ship. The next full car pushes the empty car off the dumper. It rolls down through retarder (D) to the proper track. All this is done by push-button control.



Automation with UNION CAR RETARDERS cuts costs on coal-loading dock

Forty carloads of coal an hour can be loaded on shipboard with this coal-handling system at a Lake Erie coal dock at Conneaut, Ohio.

This job formerly required a crew of men riding the cars and working the hand brakes—a hazardous occupation. Insurance rates were high and frequently men had to wait for the next ship to be loaded.

Now the work is handled quickly

and safely by a push-button system using UNION Electro-Pneumatic Car Retarders. Costs have been greatly reduced and hazards eliminated.

If you have a materials-handling situation involving many carloads of coal, ore or other products, let us show you what can be done with automatic car-retarder systems to increase efficiency and reduce costs. Write for complete information.

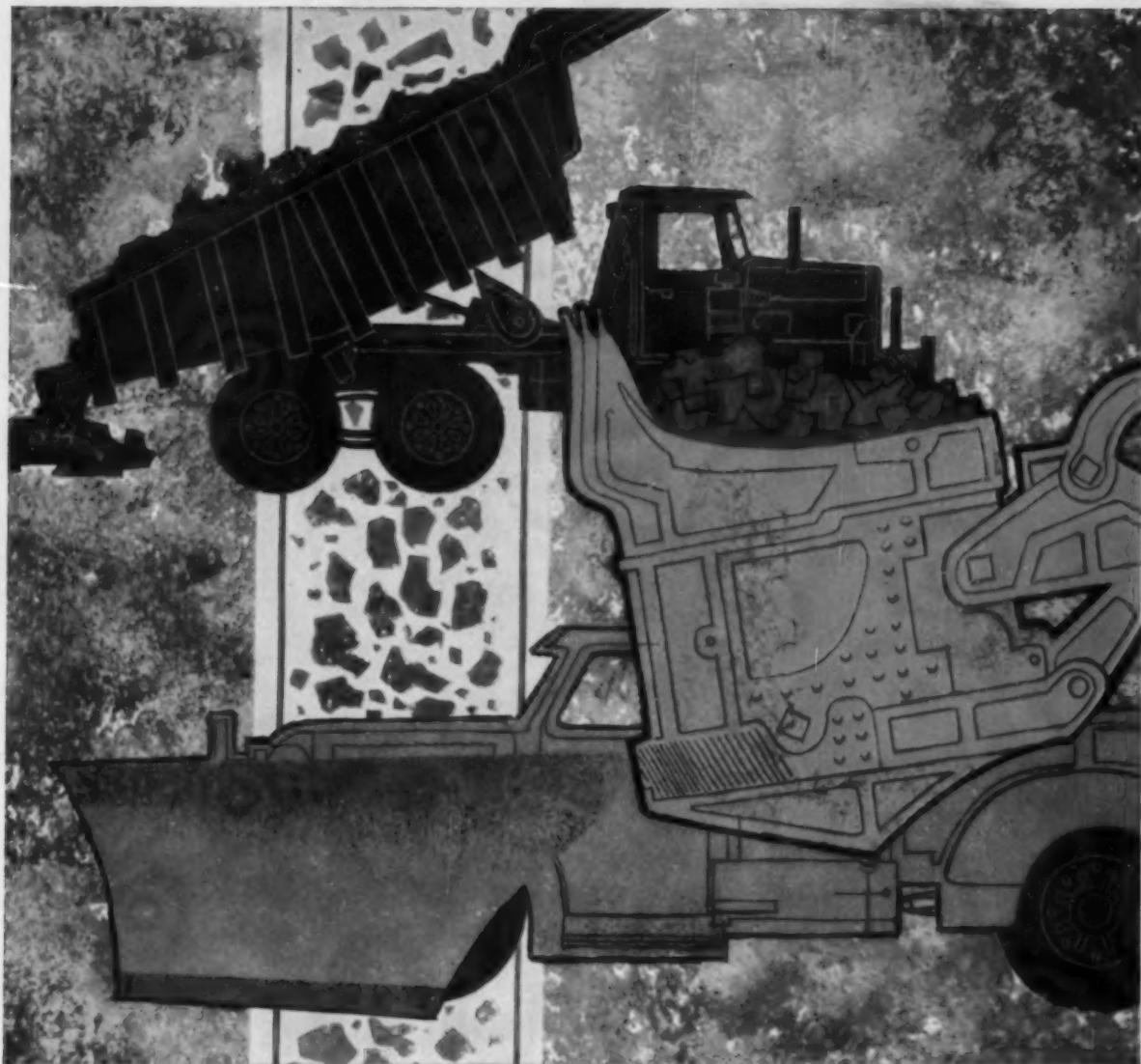


UNION SWITCH & SIGNAL

DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY

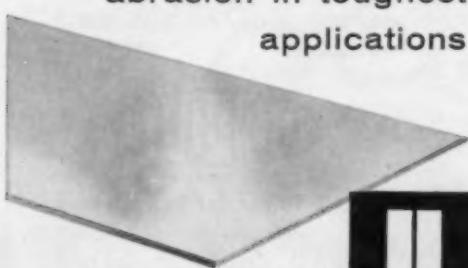
SWISSVALE, PENNSYLVANIA

NEW YORK PITTSBURGH CHICAGO SAN FRANCISCO



JALLOY special alloy steel

resists impact and
abrasion in toughest
applications



Heat treated Jalloy steels wear as much as 20 times longer than mild steels under rigorous impact and abrasive conditions. By using Jalloy you can cut maintenance costs drastically. Increased product life reduces downtime and lowers your labor costs.

Jalloy steels are available in the forms you require (plates, hot rolled sheets, hot rolled bars, small shapes and structural). Jalloy can be purchased in three grades to meet specific use requirements: Grade 1, where formability is important; Grade 3, capable of being heat treated to excellent physical properties for good resistance to abrasion or wear; Grade 7, where high hardness with good ductility or wear resistance is desirable.

Your local distributor can supply you with latest information on these Jalloy grades, or you can write to Jones & Laughlin Steel Corporation, Dept. 411, 3 Gateway Center, Pittsburgh 30, Pa.

Jones & Laughlin
... a great name in steel



3000' mother conveyor spans open area between two mountains to haul coal from feeder belt.

Why Stonega uses neoprene in Crossbrook Mine

Stonega Coke and Coal Co. uses a 3-mile-long network of conveyor belting—much of it neoprene—to bring coal out of its Crossbrook Mine near Big Stone Gap, Va. Neoprene belting is used because its balanced combination of properties offers long-term economy.

Neoprene covers have excellent resistance to abrasion, cutting and chipping. They provide lasting protection against fabric damage from mildew, acid water and load abrasion. Neoprene's resistance to aging,

oil and grease, sunlight and weathering is further assurance of long belt life—underground or on the surface. And neoprene's flame resistance offers greater safety.

Next time you replace your conveyor belting or buy a new conveyor, be sure to specify neoprene. Its combination of properties means long-term economy and safety. We would like to tell you more about neoprene and its many useful properties. A request will put your name on our mailing list for regular, free

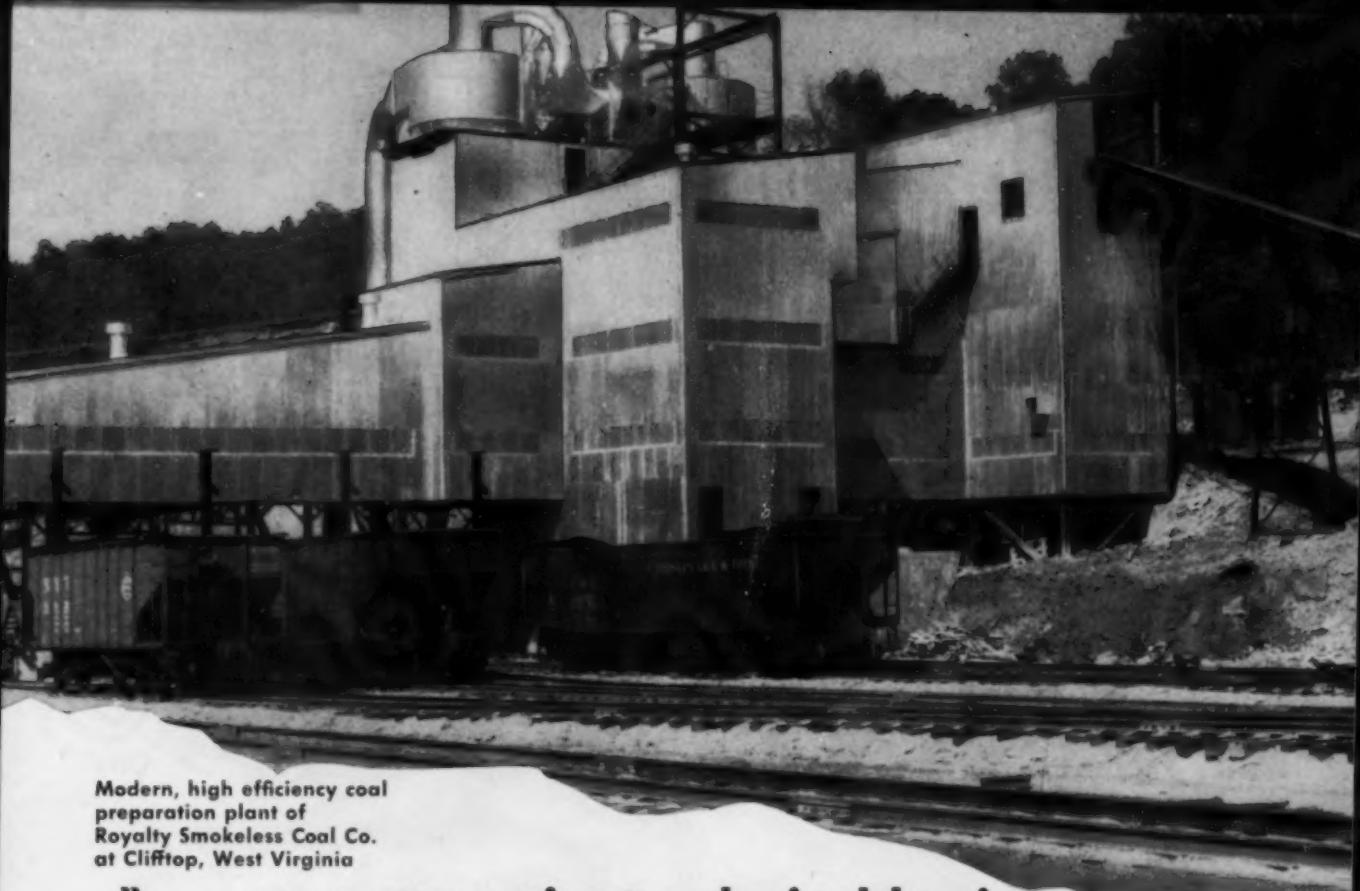
copies of the Elastomers Notebook. Just write: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department CO-8, Wilmington 98, Delaware.



**Better Things for Better Living
...through Chemistry**

NEOPRENE

made by Du Pont
for 25 years



Modern, high efficiency coal preparation plant of Royalty Smokeless Coal Co. at Clifftop, West Virginia

"... we get maximum desirable sizes

with

AIRDOX™

NON-EXPLOSIVE MINING METHOD

AIRDOX

NON-EXPLOSIVE MINING METHOD

Cuts Costs 5 Ways

- Produces less fines in face preparation
- Rolls coal forward for faster, easier loading
- Easier on "tender" roofs—cuts timbering, bolting
- Lowers cleaning costs by minimizing fines
- Reduces degradation—no shattered coal



declares E. W. POTTER,
Vice-President
Royalty Smokeless Coal Company

"Our Royalty Fire Creek Seam coal is low volatile New River coal. We have found that by using Airdox to break the coal down we get maximum desirable sizes—Lump, Egg, Stove, Nut and stoker. Airdox also improves the loadability of the product, thus resulting in more value in domestic and industrial sizes."

If you are not now getting these and all the other proven benefits of Airdox, we suggest you write for a free survey. It may well show you the way to more profitable production and improved marketing opportunities.

SEE THE FACTS

WRITE FOR A FREE SURVEY

CARDOX CORPORATION • 307 NORTH MICHIGAN AVENUE • CHICAGO 1, ILLINOIS

**WAREHOUSES
and
DISTRICT OFFICES**

Harper, West Virginia
Phone: Beckley 4812
Benton, Illinois
Phone: Benton 8-3821
St. Clairsville, Ohio
Phone: St. Clairsville 619

Elkville, Kentucky
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Phone: Robinson Creek 3
Louisville, Colorado
Phone: Boulder
Milepost 2-7299

Library, Pennsylvania
Box 427
Phone: Library Colonial 3-6910
Comden-on-Gauley, W. Va.
Phone: Comden-on-Gauley 7101

Evansville, Indiana
307 Northwest Fifth St.
Phone: Evansville 2-8944
Ottumwa, Iowa
Phone: Ottumwa
Murray 4-6564

YOU CAN RELY ON Euclid

for dependable stripping and haulage equipment



With the rise in costs putting the pinch on coal mining profits, it's more important than ever to have equipment that will produce more and protect your profit margin. Have you checked the cost-cutting advantages of Euclid equipment recently?

The TC-12 Twin-Power Crawler, for example, with a total of 436 hp, has the size, weight, power and traction to handle the toughest stripping jobs. Two 218 hp engines and separate Torqmatic Drives for each track give this "Euc" unmatched work-ability and maneuverability. Eight rollers and 7074 sq. in. of track area assure good stability with heavy duty dozer and ripper attachments. Top speed is 7.8 mph forward or reverse.

Euclid Coal Haulers are available in 25, 40 and 51 ton capacities, powered by 210 to 360 hp engines, with Torqmatic Drive, 5-speed and 10-speed transmissions. They



are designed and built as complete units with proper weight distribution for maximum traction and ease of handling.

Have your nearby Euclid dealer make a production-cost estimate for your operation. With a complete line of job-proved Scrapers, Rear-Dumps, Bottom-Dumps and Crawler Tractors, chances are good that he can show you how to cut your costs and increase production... and why **Euclids are your best investment.**

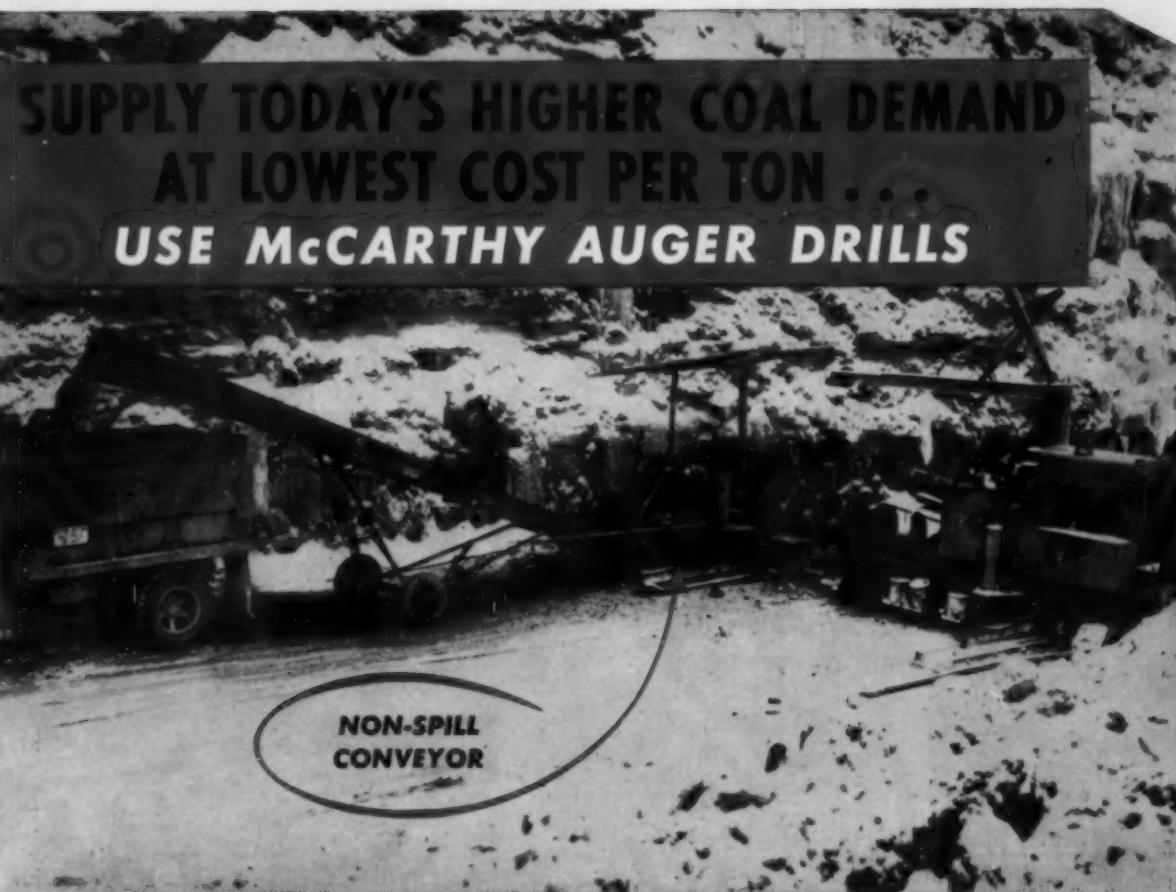
EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio



Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE





HEAVY - RUGGED - POWERFUL SELF-MOVING FROM HOLE TO HOLE

FINGER-TIP CONTROL



Gives Desired Rotating Speed Of Auger

HYDRAULIC FEED



Provides Any Speed Up To 6 Feet
Per Minute Horizontal Feed Of Drill

Today's increasing demand for coal and the low operating cost of McCarthy Coal Recovery Drills is a profitable combination.

Two men operate the drill augering 60 to 75 tons of coal per hour with the McCarthy Model 1436—42x12 ft. drill pictured above. Holes are 42" in diameter; 144 ft. deep. This drill is equipped with McCarthy Safety Auger Guide which directs auger into coal seam without any climbing or jumping of auger.

Twelve different models of McCarthy Coal Recovery Drills mine this low-cost "bonus coal." Auger diameter ranges

from 16 in. to 42 in.; auger sections are 6 ft., 12 ft., or 24 ft. long.

A new auxiliary conveyor—at the boring end—eliminates spillage at the hole. It operates from either side of the drill. This permits working right to the end of a blind cut. When the cut is open at both ends, it permits working from the side nearer to access roads, saving time and mileage for the trucks.

Contact your nearest Salem Tool Co. distributor, or write for Bulletins M-101 and M-102 for detailed information on the complete line of McCarthy Coal Recovery Drills.

MANUFACTURERS OF DRILLING EQUIPMENT SINCE 1901

THE SALEM TOOL CO.

763 SOUTH ELLSWORTH AVENUE • SALEM, OHIO, U. S. A.



There's a quality-built LIMA to fit every mining job

You get down to pay dirt faster when you have power-packed Limas digging for you. Limas are rugged machines designed to master the toughest digging jobs . . . they strip away overburden fast in big, profitable bites . . . they get coal and ore loaded fast. Built in sizes from $\frac{1}{2}$ to 6-cu. yds., there is a Lima matched to your mining operation.

These quality features are built into job-matched Limas!

air-controlled clutches on the larger types for ease of control and instant response.

anti-friction bearings in the drums and other critical parts to keep wear at a minimum and lessen lubrication problems.

dirt seals and retainers in crawlers exclude abrasive material.

torque converter drive (optional) for greater power without stalling.

big-capacity drums for longer cable life.

And, remember, wherever you are, you can depend on skilled service and nearby service stocks of parts to keep downtime to a minimum. See your Lima distributor for complete information about the machine best fitted to your needs . . . or write Construction Equipment Division, Baldwin-Lima-Hamilton Corporation, Lima, Ohio.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

BALDWIN - LIMA - HAMILTON

Construction Equipment Division - LIMA WORKS

OTHER DIVISIONS: Austin-Western • Eddystone • Electronics & Instrumentation • Hamilton • Loewy-Hydropress • Madison • Peltor • Standard Steel Works



Lima Type 34 Paymaster Dragline working in lead and zinc tailings near Wallace, Idaho. Machine has 45-ft. boom.



Lima Type 1201 Shovel stripping overburden in iron ore operation near Kinney, Minn. Machine is equipped with 32 1/2-ft. boom, 22-ft. dipper handle, and 3-cu. yd. dipper.



Lima Type 2400 High Lift Shovel with 60-ft. boom, 45-ft. dipper handle, and 4 1/2-cu. yd. dipper, mining coal near Holloway, Ohio.



Yellow Strand



... always on hand

A Specialist helps you select the wire rope best for your job

You can depend on your Yellow Strand distributor for recommending the right size and type of wire rope — and for ample stocks on hand.

He knows exactly the rope to best fit your equipment for greatest wire rope service. He maintains stocks of standard strength Yellow Strand, Yellow Strand "POWERSTEEL" and Yellow Strand Flattened Strand to promptly supply your needs.

Add to that the extra qualities of wear resistance, shock resistance and long life manufactured into Yellow Strand products and you have a hard-to-beat combination.

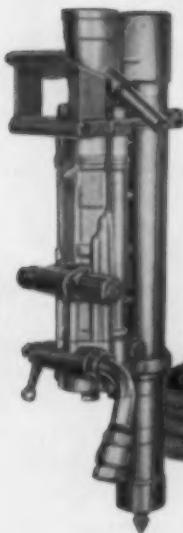
Wherever your job may be Yellow Strand is near at hand. Distributors and factory warehouses are located throughout the entire U.S.A. Call them for the service of an expert, and longer rope life.

Where you see Yellow Strand at work, you'll see wire rope records of long life and dependability. Steady, day after day performance proves Yellow Strand's toughness, ability to "take" shock and wear of heavy loads.

Yellow Strand

BRODERICK & BASCOM ROPE CO.
Manufacturers of Wire Rope for over 80 Years
4203 Union Blvd., St. Louis 15, Mo.





Steel changes for the S-12V stopers are 24, 30, and 36 inches long. Overall stoper heights are 37, 43, and 49 inches.

Large openings and high vacuum make the Vac-Nu-Matic dust box equally efficient at removing dry or wet cuttings.



Right: The new S-12V Vac-Nu-Matic fills the need for a heavier dust-collecting stoper to speed up roof-bolting operations which are so essential to continuous coal mining.

New Le Roi Dust-Collecting Stopper Speeds Drilling in Hard Top Formations

S-12V stoper features popular Vac-Nu-Matic® dust collection system.

Enables miners to increase drilling footage with less effort.

The new Le Roi S-12V Vac-Nu-Matic stoper combines greater heft, more power, and positive "through-the-drill-steel" dust collection — for faster, dustless drilling of roof-bolt holes in hard top formations.

Its powerful piston impact, free-cutting bits, and powerful rotation assure faster penetration—eliminate stuck steel. The stoper's heavier construction is balanced for easy handling—enables the operator to work more efficiently and in greater safety.

Le Roi's Vac-Nu-Matic dust-collec-

tion system is an integral part of the stoper. Since no additional equipment is needed, the S-12V reduces set-up time and can be moved easily to any part of the mine.

Positive Dust Collection

All system components are specially designed to assure positive dust collection throughout the entire drilling cycle. This integrated design keeps dust count in the drilling area well below the approved Bureau of Mines standards.

What's more, the S-12V can be used with two types of bits to cope with changing seam structures. The Vac-Nu-Matic bit is best suited for soft formations, while the 5-hole CRD bit is recommended for medium to extremely hard top structures.

A touch of the operator's finger-tip provides finely graduated feed-pres-

sure control to meet varying requirements. Constant blowing at the chuck keeps cuttings out of drilling mechanism, assuring long, trouble-free service. Other features include socket-type sliding chuck, end-seating automatic valve, positive pressure in both directions, and short stroke.

Feeds and Weights

The new S-12V stopers are available with 28-, 34-, and 40-inch feed legs, and weigh 105, 110, and 115 lbs. respectively. All are adaptable for hand-held operation or jumbo mounting.

Write today for information on the new stopers. Also ask about the new dust-collecting conversion kits that Le Roi offers to change older S-11 and S-12 stopers to cost-saving Vac-Nu-Matic dust collection.

"Vac-Nu-Matic" is the registered trademark for Le Roi's dust collecting stopers, bits, and dust boxes.



Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Newmatic air tools, portable and Tractair® air compressors, stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

A Day and Night Difference!

NEW *Femco* MINE-LITE* SYSTEMS

Now—Femco makes the finest
fluorescent lighting systems
for underground efficiency

SEE a day and night difference in working conditions! Here is portable area lighting ready now for men who mine.

SEE a day and night difference in design features! Famous Femco engineering has scored again with a superior product.

SEE a day and night difference in maintenance! Top up, old lamp out, new lamp in, no fuse to change. Sealed-in ballast is guaranteed.

Get the facts—ask for data

Distributed by:

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INDUSTRIAL PHYSICS & ELECTRONICS CO.,
SALT LAKE CITY, UTAH



SAFE AND SURE Permissible systems have U. S. Bureau of Mines approval for gassy atmospheres up to the working face.

DESIGNED RIGHT Extra rugged lamp unit weighs only 12 lbs. Exclusive sealed-in Femco ballast is in the base for ease of standing.

EASY TO USE Systems are completely portable. Forty lamps use only 10 amperes. 230 Volt power source permits long cables.

MANUFACTURED BY

Femco, Inc.

IRWIN, PENNSYLVANIA
Underhill 3-3200

Makers of the famous Femco Trolleyphone



How to Install Bethlehem Roof Bolts

Illustrated here are four simple steps to take when installing Bethlehem Square-Head Roof Bolts. Regardless of the length and diameter of the bolts used, this procedure enables the job to proceed at a steady pace, and helps materially in minimizing installation costs.

Bethlehem Square-Head Roof Bolts are made in $\frac{5}{8}$ -in., $\frac{3}{4}$ -in., and $\frac{7}{8}$ -in. diameters, and are furnished in a wide range of lengths. We also manufacture a 1-in. slotted roof bolt, for use where a heavier bolt is required.

We recently issued an interesting 20-page illustrated catalog on roof bolting. If you would like to have a copy for reference, all you need do is drop a line to the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation



**BETHLEHEM
STEEL**



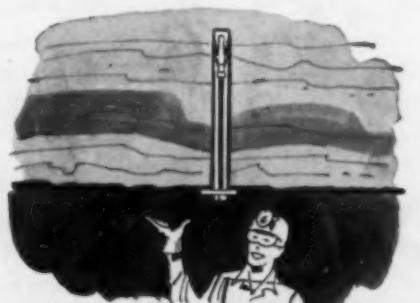
1 Using regular drilling equipment, the hole is drilled to required depth.



2 The assembly, consisting of roof bolt, square roof plate, malleable-iron shell and steel plug, is inserted in the drilled hole.



3 Bolt head is tightened with power wrench. This draws down the plug, expanding serrated leaves of shell



4 The shell is anchored securely. Square roof plate furnishes additional support. Steel ties, connecting a series of holes, may be substituted.

NEW LONG

Model 88-C

PIGLOADER

with the lowest operating height of
any high-capacity loading machine



The only loader designed specifically for continuous loading with the Piggyback Conveyor System

Representing the first major innovation in loading machine design in many years, the LONG Pigloader* offers low operating height, straightforward design simplicity, minimum maintenance, high-capacity operation, full independent crawler control, unequalled stability, and unusual digging and trampling power—all vital to handling the high-concentrated tonnages of the Piggyback* Conveyor System of mining.

In this design, a single 40 HP electric motor drives all machine operations. All functions are controlled hydraulically from a single bank of finger-tip control valves. Maximum digging and trampling power is provided as the full 40 HP can be utilized for each operation. Long wheel base and wide tracks give exceptional stability and positive operation even in soft bottom. With the Pigloader's trampling and digging ability, it is able to go to the back of the cut with each pass at the face. Rated capacity is 4 to 6 tons per minute and trampling speed is 95 feet per minute.

In addition to its superior operating features, the Pigloader offers other important advantages. For example—it has fewer, heavier parts, and its simplified design greatly facilitates maintenance.

*Pigloader and Piggyback are trade marks (Reg. U.S. Pat. Off.) of The LONG Company



LONG Model 188-C
PIGLOADER
For Shuttle Car Loading

The Model 188-C is identical to the 88-C, except it is equipped with a swing boom for loading into shuttle cars.

Write for Bulletin No. 4010—or ask for a demonstration.

The

LONG

Oak Hill, W. Va.

Company



Detacord branch line is connected at a right angle to the Detacord trunk line with a double half hitch, drawn up tightly around the trunk line.

Photograph shows part of a small secondary blast, hooked up and detonated with Detacord.

Note the trunk line is connected with a double half hitch.

DETACORD®

An effective, economical detonating fuse for
Secondary Blasting, Long Hole Underground
Blasting and Pipe Line Ditching

For this secondary blast, Detacord is used to prime the charge in each of the large chunks. A trunk line of Detacord connects with these branch lines and is, in turn, detonated with fuse and cap (or electric blasting cap). Result: an instantaneous blast which will "go" only when you give the word, with no danger of a premature caused by stray currents.

Detacord is a "little brother" to Primacord. It comes from the same family but it's smaller, less powerful. The core of PETN is not as large as in

Primacord — and for this reason Detacord should not be used in primary blasting. But for secondary blasting, long hole underground and pipe line ditch blasting you'll find it effective — and economical.

Detacord has a waxed textile cover, light brown with cross windings of red yarn forming an X pattern. It is very flexible — is easily tied in square knots and half hitches as shown. Tensile strength 100 lbs. 500-ft. spool weighs 8 lbs.; 1000-ft. spool weighs 16 lbs.

See your explosives supplier or write for further information

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut • Since 1836

Detacord® and Primacord® Detonating Fuse • Safety Fuse • Ignitacord®
Quarrycord® • Pyrotechnical Devices and Blasting Accessories

The entire blast is detonated with fuse and cap (or electric blasting cap), the cap taped securely to the end of the Detacord trunk line, with the business end of the cap pointing in the direction of the explosive wave.

D-1

AUGUST, 1957

IVAN A. GIVEN, EDITOR

New Factor

THE CHANGING NATURE of coal production is perhaps most vividly evidenced by the change in the labor percentage in the final cost. Labor at one time was by far the biggest item, far overshadowing all other costs, including supplies, power, sales, depreciation and depletion, overhead and so on. Now, a new mine built at a cost of \$8 per ton of annual capacity, including coal, might experience other-than-labor costs of something in the nature of the following: mine cost, \$0.40 per ton; welfare, \$0.40; power, \$0.15; supplies and parts, \$0.90; administrative and overhead, \$0.50; sales expense, \$0.25; total, \$2.60 per ton. Labor cost, at an average output of 15 tons per man, would be approximately \$1.50.

One conclusion is that coal-sales contracts must be drawn to reflect this changing picture. With supplies and equipment, for example, bulking so large in the final cost—and steadily rising in price—the escalation clauses in contracts should protect against increases in their costs, as well as against increases in labor cost. The industry is attempting to develop an index on which to base such clauses. Meantime, the prudent operator should take steps to make sure his profit margin is not unduly eroded.

Britain Today

THE TENTH YEAR, 1956, of public ownership and operation of the coal-mining industry of Great Britain found output up 17%, to 222 million long tons, compared to 1946. A further increase is expected in 1957, though lack of mining capacity, which put a ceiling on deep-mined output in 1952, will keep it small. This shortage in productive capacity, in fact, is Britain's biggest single factor, and to improve the picture in this respect plans call for spending over \$2 1/4 billion dollars over the next 10

years to bring capacity up to 240 million tons in 1965 and 250 million in 1970.

The high cost of this relatively modest increase in capacity is a measure of the depths and other difficulties involved in coal mining, not only in Great Britain but the Continent as well. It is also the reason for British and Continental interest in substitute forms of energy—particularly oil and nuclear power. How fast they can be brought along and what they will cost under full-scale conditions, particularly the nuclear form—will be of both immediate and long-range interest to U. S. producers. The export market is of both immediate and long-range concern, while the course of nuclear development will be an indication of if, when and how much such competition will be felt here.

Tonnage Keys

DEEP PRODUCTION TODAY is more and more resting on a piece of material about the size of a finger nail. This is the tungsten-carbide tip of a cutter bit—the agent by which more and more of the underground output is broken out of the solid and started on its way to the market. Then there is hydraulic fluid, without which it would be practically impossible to build today's flexibility and capacity into machines. These are but two of a list of products, including oil and grease for lubrication, that may seem secondary in character at first glance but really are the keys to both tonnage and efficiency under today's conditions.

Consideration of this fact leads logically to a few conclusions. First, careful fitting of these products to the job is vital. This means, among other things, that the best should be purchased for top performance and long life. Second, they should receive the care in application and use that their importance to production warrants. Dull or broken bits, foaming hydraulic oil and dirty lubricants exact both immediate and long-run production and cost tolls.

Are the Railroads Ready . . .

IN TERMS OF PHYSICAL FACILITIES—car supply, port storage and dumping capacity—the seven major export-coal carrying railroads will be well-equipped to handle the increasing volume of overseas coal traffic from mine to tidewater.

This is the central fact coming out of a *Coal Age* survey conducted to determine the existing, planned and potential capacity of export coal facilities in Hampton Roads, Va.; Baltimore, Md.; and Philadelphia, Pa.—the three tidewater ports which handle virtually all bituminous and anthracite overseas coal shipments.

The railroads and ports they serve were: the Reading—Philadelphia; the Pennsylvania—Philadelphia and Baltimore; the Western Maryland and the Baltimore & Ohio—Baltimore; the Chesapeake & Ohio, the Norfolk & Western and the Virginian—Hampton Roads.

On-the-spot interviews with export coal traffic management officials of these railroads show:

1. The seven major export carriers have accepted high-volume overseas coal shipments as long-range business.

2. Each carrier has unused tidewater capacity and/or is adding new facilities which will be more than adequate to handle increases anticipated in their export traffic during the foreseeable future.

3. The potential for adding to practical-existing and soon-to-be-completed tidewater capacity is fantastically large.

In Philadelphia, the Reading could construct 12,000,000 tons of new capacity.

In Philadelphia and Baltimore, the Pennsylvania could add 2,500,000 tons of capacity just through operational changes and yard modifications alone.

In Baltimore, the B & O could double export capacity from 5 or 6 to 12,000,000 tons through new con-



By W. A. RALEIGH, JR.
Assistant Editor, COAL AGE

struction; the Western Maryland conceivably might add at least 2,000,000 tons of capacity by converting its labor force from a one- to a two- or three-shift basis.

At Hampton Roads, the C & O, the N & W and the Virginian all report that adequate lands are available—in or nearby Norfolk—for large-scale expansion of tidewater operations.

4. No great concern is expressed over the prospect of more large colliers coming into the export coal trade. All piers can now handle vessels of 15 to 20,000 tons and upwards capacity, or could do necessary dredging to accommodate same.

5. The seven reporting railroads expect to cover all or nearly all orders for tidewater loadings for the foreseeable future. Temporary tightness

may occur because of extraordinary demands, as, for example, during the Lake season or after the miners' holiday. Existing hopper supply will be made still better by stepping up car turnarounds and by putting substantial numbers of new cars and locomotives into service.

6. The biggest tidewater headache is matching ship and car arrivals. Delays in ship arrivals—occurring most frequently in the winter months—can foul up the fluidity of the entire mine to tidewater operation. Most officials accept this as an inevitable situation due primarily to bad storms in the Atlantic or to the need for voyage-vessel repairs. One carrier, however, sees better communications between vessel owners and transshippers as a possible solution.



Here is a first-hand report on how the major export carriers see their ability to handle future increases in overseas tonnage

Tomorrow's Exports?

CLIMBING TO RECORD PEAKS, export coal dumpings at Hampton Roads, Baltimore and Philadelphia have been running at an annual rate of over 60,000,000 tons.

1,723,805 tons and 387,644 tons last year.

The installation of steel and belt conveyors on Pier 11 will be completed in August, thus making it possible to load all coastwise and cape barges there and freeing Pier 18 for exclusive loading of steamships. Pier 18 can now handle 45 to 50 steamships per mo, or 10 to 15 more per mo than previously. Its combined anthracite and bituminous export capacity is put at 4,000,000 to 4,500,000 tons annually.

On drawing boards, Reading has plans to add two more coal-loading piers, each with a capacity of 6,000,000 tons per yr. These plans are part of a long-range program, the implementation of which depends on stronger assurances of a higher volume of export traffic through Philadelphia. Chances are that one pier would be built at a time. The plans would also include (1) modernizing storage and classification yards, (2) adding capacity for 1,000 cars, and (3) scrapping Pier 11.

No extraordinary problems are met in managing present pier traffic. If congestion occurs, it would probably be from lack of pier capacity and, in cold weather, from lack of thawing capacity. However, both of these potential bottlenecks could be broken by adding facilities.

Pier 18 has 32 ft of water at dockside and can presently handle vessels of 16,000 tons cargo capacity. If necessary, dredging could be done to accommodate larger vessels.

If export coal traffic increases as expected, car shortages are likely to occur but such will not be as acute as in late 1955 and in 1956. A car-building program is underway. Since the number of cars added under this program will be greater than the number of cars scrapped, the car situation should improve progressively during the next 5 yr.

(Continued on next page)

7. Classification can also be a problem. The worst snags occur when small operators ship mixed grades of coal which have to be tested and blended to fill cargo specifications for as many as eight or more grades. Where practical, the best solution here is to test shipments before arrival at port.

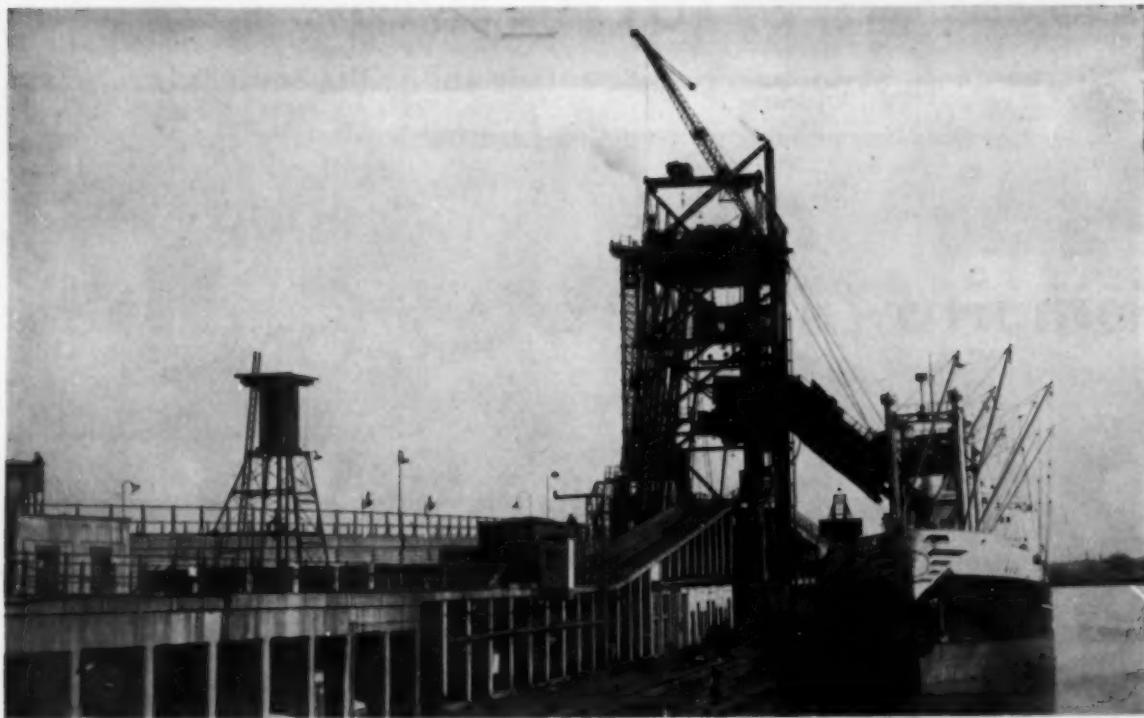
Detailed results of the *Coal Age* export facilities survey are given below. Also on p 61 note the strong case for reopening the port of Charleston, South Carolina, to export coal.

PHILADELPHIA

Reading

"There is ample room for expansion with construction of two additional coal towers of 6,000,000 tons each."

The Reading expects that its Port Richmond piers—Philadelphia, Pa.—will handle 2,500,000 tons of anthracite and 425,000 tons of bituminous in 1957 compared, respectively, to



READING—Port Richmond's Pier 18 can now handle 45 to 50 ships per mo, 10 to 15 more per mo than previously.

Plan Now for the Buyer's Market in Export

THE MAJOR EXPORT - COAL CARRYING RAILROADS have made an outstanding contribution to the permanency of coal's booming overseas market.

This contribution could be judged by the survey here which shows how seriously the carriers are taking their job of managing and improving the movement of coal from mine to tidewater.

It could also be judged by the vigorous participation of the three Pocahontas railways in the formation and development of American Coal Shipping, Inc.—a major factor in reducing the basic ocean freight rate to the mid-July low level of \$5.11 to \$6.90 per ton.

However, with mine-to-tidewater and ocean freight now apparently on their way to a good measure of stability, the export trade might well consider what still has to be done if overseas coal is to remain a growing bulwark to the entire industry.

Already there are signs that the boom is leveling off and that the buyer's market may be nearing. Overseas sales of bituminous have leaped from 15 million tons in 1954 to record tonnage this year which may reach 55 million tons. A closer analysis of the figures, however, shows that the boom has slowed down. Compared to annual tonnages of the previous year, overseas shipments

increased 127% in 1955, 41% in 1956 and probably will register about a 15% jump in 1957. Anthracite exports—at a 5-mo annual rate of 3,000,000 tons this year—are only running about 3% above the 1956 tally which was four times greater than in 1955.

At these rates of leveling off, anthracite exports may have already reached their peak; bituminous shipments may carry forward with natural momentum and hit 65 million tons by 1965. Whether anthracite and bituminous push beyond their peaks or maintain peak tonnage will depend on how well they gear up now for the buyer's market in overseas trade.

Most loudly signaling the approach of the buyer's market is increased talk and evidence of limits on dollar availability. France, for example, is reported to be planning on a cutback in U. S. coal purchases because of dollar shortages. For the same reason, Argentina is shifting its coal imports from the U. S. to Poland.

Also, worth noting: the six nations of the European Coal and Steel Community—the biggest area market for U. S. coal—are now importing 100 million tons of coal-equivalent energy at a cost of \$2 billion. But economists doubt that Europe's balance of payments could stand the strain of a \$6 billion bill—the amount required to scale up pur-

chases to the 300 million tons of coal-equivalent energy estimated as needs by 1975. Adjustments to the dollar strain will certainly include more use of nuclear power; they may also include greater use of native, low-grade coals.

Whatever the adjustments to the dollar strain, the apparent leveling off in the export boom means that coal should act now to anticipate the buyer's market. More specifically, for example:

1. The overseas buyer should be put in the same category as the domestic customer. Importers must be kept continually sold on the advantages of using high-quality American coals. Overseas customer service departments might be established.

2. To solidify the permanency of low-level ocean freight costs, the program for replacing ACS Liberties with modern, large colliers should be expedited.

3. Steps should be taken to publicize the story overseas of what U. S. producers, the UMWA, the major export rail carriers and other related interests are doing to provide quality U. S. coal, at the lowest possible delivered price, to the peoples of the world.

PHILADELPHIA AND BALTIMORE

Pennsylvania

"As there is presently more capacity than is used, we are endeavoring to put this unused capacity to work before seriously considering increased dumping facilities."

1956 export dumpings of anthracite at Greenwich piers, Phila., Pa.—1,175,000 tons—and of bituminous at Canton piers, Baltimore, Md.—1,145,000 tons—should rise, respectively, to 1,800,000 tons and 2,000,000 tons in 1957.

Although combined export tonnage (Greenwich and Canton) may thus increase from 2,320,000 tons to 3,800,000 tons, existing capacity would permit efficient handling of 5,000,000 tons of overseas coal. Still another 2,500,000 tons of capacity could be made available by operational changes and modification of yard facilities.

In seeking better management of export coal traffic, the Pennsylvania has found the payoff in a complete reorganization of export coal service. Key to the reorganization has been a more efficient system of handling cars to avoid delays on rails and at ports. The system was put into effect Mar. 12, 1956, and is based on separating domestic and export coal classification, on requiring stricter control of permits, and on coordinating movements to meet boat schedules.

The new Conway classification yard west of Pittsburgh has made the Harrisburg yards available for the classification and forwarding of bituminous export coal cargoes to Philadelphia or Baltimore. Still further segregation of traffic has been achieved by reactivating certain idle West Philadelphia yard tracks for classifying export anthracite. Thus, classified export cargoes can now be moved from classification points to tidewater coal yards to coincide with vessel arrivals.

A stricter permit system calls for issuing 14-day permits to load cars at shipping points, move them to classification yards and dump them at piers. With stricter permit control of its total fleet of 55,000 serviceable hopper cars, the Pennsylvania figures that a one-tenth improvement in car turnarounds can make 5,500 more car-loads possible per month. Largely as a result of this effort, car dumpings at Baltimore in 1957 have been as high as 3,000 cars per month—double that of any month last year.



PENNSYLVANIA—A complete reorganization of export coal service including more efficient handling of cars, has expedited traffic at Greenwich (above) and Canton (below) piers. Car dumpings at Canton, for example, have been as high as 3,000 per month in 1957—double that of any month last year.



The Pennsylvania is also improving car supply through new construction and repair. In the first 6 mo of this year, the railroad expected to have 2,700 new hoppers and 53 new diesels in service; 50 more diesels have been ordered for delivery in the last half. A class-repair schedule to renovate 14,000 cars in 1957 has been curtailed somewhat by reduced demand during the first six mo. No serious or prolonged difficulties in car supply are anticipated this year.

Looking to the future, the Pennsylvania sees no big problems in handling large colliers. Its piers could now handle 20 to 22,000 ton water-ballast ships. If necessary, dredging could be done to accommodate deeper draft vessels. Channel and harbor con-

ditions at both ports are excellent.

As far as the railroad is concerned, efficient handling of export coal requires a coordinated car movement to meet vessel arrival. Needed most: better communication with vessel owners and transshippers. If the Pennsylvania could have firm 72-hr advance information on ship arrivals, vessel position in the port and loading instructions, their traffic personnel could have all coal on hand at port, classified to dump on arrival of the vessel.

Worth noting: current problems and future needs in export coal traffic management are under continuous study by the Pennsylvania's Coal Research and Development Dept.

(Continued on next page)



B & O—Facilities at Curtis Bay Piers could handle 10,000,000 tons of inside cape and export coal. 1957 traffic is estimated at 5,500,000 tons.



WESTERN MD.—Port Covington piers feature rotary and lift dumpers. On a one-shift basis, the port can export 2,000,000 tons annually or twice expected 1957 tonnage.

BALTIMORE Baltimore & Ohio

"Through new construction export capacity could be expanded to 12,000,000 tons or more."

The B & O estimates that total tidewater traffic at its Curtis Bay piers will amount to 5,500,000 tons of bituminous coal in 1957, or about the same as last year. The road's tidewater coal traffic through Curtis Bay piers—5,320,000 tons in 1956—was divided almost evenly between export and inside cape tonnage.

Existing tidewater facilities are adequate to handle efficiently 10,000,000 tons of inside cape and export coal, or almost double present volume. Through new construction, export capacity could be expanded to 12,000,000 tons or more. No such plans, however, are yet under serious consideration because of the large amount of unused capacity already available.

Most vessels now berthing at Curtis Bay piers carry 10,000 to 12,000 tons of coal. But channel and dockside-draft conditions could accommodate water-ballast ships up to 20,000 tons or even more.

Although there are no unusual problems in managing present tidewater traffic, the B & O sees two possible lines of improvement:

1. A continuous flow of ships could

step up car turnarounds and bring greater efficiency in yard car handling. Ships frequently arrive in lots of 5 or 6; at other times, no bottoms are available.

2. Fewer grades of coal could expedite classifying. Yards now have to classify many different grades.

Car supply is expected to meet most demands for tidewater loadings in 1957 and 1958. The B & O has 2,000 new 70-ton hoppers on order from the Bethlehem Steel Co. A substantial number of these are scheduled for delivery in the fourth quarter of this year; the remainder are due in 1958.

Also contributing to improved car supply will be (1) more deliveries of new hoppers from the railroad's DuBois, Pa. shops, and (2) an energetic car repair program. Within the near future, the DuBois shops will have turned out 2,000 new hoppers.

Western Maryland

"A continuous 3-yr program is now underway to modernize yard layout for all tidewater shipments. The probable net result for coal: added capacity through better handling of cars and more efficient classification."

Export loadings of bituminous at Port Covington piers might reach 1,000,000 tons in 1957—a 30% in-

crease over last year's tally. Under normal operating conditions (i.e., on a one-shift basis, making allowances for bad weather and delayed ship arrivals), the Western Maryland estimates it could dump about 2,000,000 tons of overseas coal annually. Total tidewater capacity, including inner harbor loadings, is put at 4,500,000 tons annually. Inner harbor loadings amounted to about 1,250,000 tons in 1956.

The railroad's port operation and yards serve grain, ore and general merchandise shipments as well as coal. Therefore, it is difficult to say how much more export coal tonnage capacity might be constructed if further expansion were justified. The planning of new facilities for any one commodity would depend on needs for the others.

However, the Western Maryland now has underway a continuous 3-yr program to modernize yard layout for all tidewater shipments. The probable net result for coal: added capacity through better handling of cars and more efficient classification.

No serious concern is expressed about the prospect of more large colliers coming into the export coal trade. Port Covington piers could now handle vessels of 20,000 tons cargo capacity.

If port congestion does occur, it is usually due to late ship arrivals. In part at least, these are considered unavoidable because of storms at sea,



C & O—Newport News piers will handle about 24,000,000 tons of overseas coal this year. Total tidewater capacity is put at 33 to 36,000,000 tons, of which 29 to 32,000,000 tons is considered available for export.

vessel breakdowns, repairs, etc. But some tightening up in the coordination of ship and car arrivals is deemed a possibility.

Congestion might also stem from testing, blending and classifying at the port. This occurs most frequently in handling shipments from small operators. In these cases, mixed grades must be tested and blended to fill cargo specifications for as many as eight different classes of coal. If testing could be done before shipments come into Baltimore, the fluidity of port movements would be improved.

The Western Maryland expects to fill all future demands for cars except for temporary shortages that always occur during the Lake season. The railroad says it can provide "100% of car supply 98% of the time."

HAMPTON ROADS Chesapeake & Ohio

"Early this year we completed an additional \$3.5 million pier

Increased coal-handling capacity at the ports and growing fleets of hopper cars among the export-carrying railroads undergird the overseas market for U. S. coal.

with a practical capacity of 6 million tons annually. Another pier is on the drawing board."

C & O's Newport News piers are expected to dump 24,000,000 tons of bituminous in 1957—about 22% more than last year's 19,593,558 tons. Total tidewater capacity is now put at 33 to 36,000,000 tons annually of which 29 to 32,000,000 tons might be considered available to the overseas coal trade.

Lands are available for "very substantial" expansion of storage yard, pier and dumping facilities, if necessary. Early this year C & O completed an additional \$3.5 million pier with a

practical capacity of 6 million tons annually. Another pier is on the drawing board. Although construction plans are not definite, chances are this pier will be specially designed to handle large vessels of 15 to 20,000 tons cargo capacity.

The planning of a large vessel pier is intended to anticipate heavier coal traffic in higher tonnage colliers. Newport News piers, however, have already loaded ships in excess of 20,000 tons of cargo coal.

Congestion at C & O's piers arises only because of the irregularity and uncertainty of ship arrivals. Unpredictable ocean weather and storms makes the scheduling of vessels almost impossible for certain periods of the year. If there is any conceivable way of accurately scheduling ship arrival dates, dumping capacities would be greatly increased.

"We expect to cover all car orders domestic and export," the railroad states. Currently, 6,000 cars are being built and, by the end of 1957, the coal car fleet should total 70,000 cars.

(Continued on next page)



N & W—Lamberts Point facilities could be expanded tremendously. Piers might be built which would at least double existing tidewater capacity. Yards might be set up 10 mi or so distant from present Norfolk pier areas.

Norfolk & Western

"A 3,200-car expansion in storage yards and improvements in telescopic shuttles on Pier No. 4—completed early this year—will expedite the classifying and handling of coal."

Lamberts Point piers should handle some 16,420,300 tons of bituminous in 1957—about 7% more than the 15,346,074 tons recorded last year. N & W estimates total tidewater capacity at 24,000,000 tons annually. Non-export tidewater shipments in 1956 amounted to 2,343,946 tons.

Additional pier facilities could be installed that would at least double

present tidewater capacity, if necessary. In fact, further expansion could be almost indefinite as yards might be set up 10 mi or so distant from present pier areas at Norfolk.

Construction this year—including a 3,200-car expansion in storage yards and improvements in telescopic shuttles on Pier No. 4—should expedite the classifying and handling of coal.

Lamberts Point piers can now accommodate vessels of 20,000 tons or more cargo capacity. N & W shares with the Virginian and the C & O the advantage of nearness to the Norfolk Navy Yard. This practically guarantees that harbor and channel conditions will be kept open and in the best possible shape all year-round.

Delayed ship arrivals are the only big headache. But storms at sea and voyage repairs render such practically unavoidable. Some flexibility in matching car and irregular ship arrivals is achieved through small-scale swapping of cars—that is, transshippers negotiate with each other so that cars committed for a delayed ship can be exchanged for loading in a vessel already available.

No appreciable car shortages are expected this year or next. Bad orders are down to 1%. During 1957, 3,920 new hoppers are due to be put into service, bringing the total fleet to 47,500. This total will make hopper tonnage capacity the greatest in N & W's history.



VIRGINIAN—Sewells Point piers have a draft of 35 ft and can accommodate almost any size vessel. Ships handling 18,000 tons have been loaded recently.

Producers Move to Export Coal Via Charleston, S. C.

EXPORT COAL FACILITIES in Hampton Roads, Baltimore and Philadelphia are more than adequate to handle present and future overseas demands for U. S. coal. But this fact is immaterial to producers in eastern and southern Tennessee, eastern Kentucky, southwest Virginia and Alabama who have been justly anxious to get a bigger slice of the lush export pie. The logical means to the end, they feel, is to reopen Charleston, South Carolina, to overseas coal shipping. By shipping to this port, they would have freight rates competitive to those now enjoyed by other producers moving coal to north Atlantic tidewater ports.

Reopening Charleston means building a modern, one pier, 3,000-ton-per-hr facility to replace the antiquated installation dismantled this year by the Southern Railway. It would cost an estimated \$3,000,000. The capacity of storage yards would also have to be increased from 800 to 2,000 cars.

If these needs can be met, backers of the proposal see a potential for shipping 5 to 6 million tons of export coal through Charleston in 3 to 5 yr. Other tidewater tonnage might also be developed, for example, to fill transport needs of coal's prospective new utility market in Florida (*Coal Age*, '57—April p 126, Aug. p 118).

To bring the Charleston export coal plan to fruition, discussions

have been underway for 8 mo between the South Carolina State Ports Authority and Harlan County (Ky.), Hazard (Ky.) and Southern Appalachian coal operators associations. No final decisions have yet been reached but all parties are reported to have expressed a genuine and sincere interest in pursuing the plan.

The biggest problem is to arrange proper financing of the new facility. The Ports Authority is authorized and willing to issue revenue bonds for the purpose, provided coal interests can provide assurance of sufficient tonnage through Charleston to make the bonds marketable. A satisfactory site—furnished by the Authority at no cost—would be accessible, either directly or indirectly, via its belt line to the three major railroads serving Charleston (Atlantic Coast Line, Southern and Seaboard).

Although the matter of insuring adequate tonnage through Charleston is difficult to pin down to a guarantee, backers of the plan point to these facts:

1. A high-level overseas market—settling probably at a minimum of 60 million tons—is now generally accepted as permanent for the foreseeable future.

2. Railways that would carry coal into Charleston (Louisville & Nashville, Southern, Clinchfield and Interstate) serve mines producing the same kind of high-volatile coal as

those in District 8 which export out of Hampton Roads via C & O, N & W, and the Virginian.

3. In all other consuming areas where this coal has competitive freight rates with West Virginia and Pennsylvania mines, it gets a proper share of the total market. Mines on the L & N and Southern railways, for example, shipped 14,199,082 tons in 1955 into competitive territory north of the Ohio River.

4. Even with adverse freight rates, mines served by the L & N shipped 1,212,481 tons of coal out of Hampton Roads via the C & O and N & W in 1956. During the current year, such shipments are running at a higher level.

5. Modern port facilities at Charleston would draw tonnage from District 13 mines in southern Tennessee and Alabama. These mines now move some small export business through Mobile, Ala., the further development of which is held back because of relatively high vessel rates from Gulf ports to Europe.

The ultimate outcome of the Charleston export plan is still indefinable. However, negotiations are reported "moving satisfactorily." If the plan does materialize, informed observers expect the new port facility to be ready for business by late 1958.

Virginian

"By adding storage tracks with capacity for 1,500 cars and by installing a low-level dumping unit to Pier No. 2, tidewater capacity in 1958 should increase by one-third."

Overseas bituminous tonnage at Sewells Point piers probably will hit about 8,800,000 tons in 1957—21% higher than 1956 dumpings of 7,260,535 tons. Total tidewater shipments are expected to rise from 10,449,880 tons to about 12,000,000 tons.

Existing storage yard, pier and dumping facilities are capable of handling 15,000,000 tons of export and other tidewater coal. If more open vessels were furnished, this ton-

nage could be increased. Tween deck vessels need trimming of coal which slows down dumpings.

By adding storage tracks with capacity for 1,500 cars and by installing a low-level dumping unit to Pier No. 2, total tidewater capacity in 1957 should increase by one-third. If business justified, more dumping facilities and additional tracks might be provided.

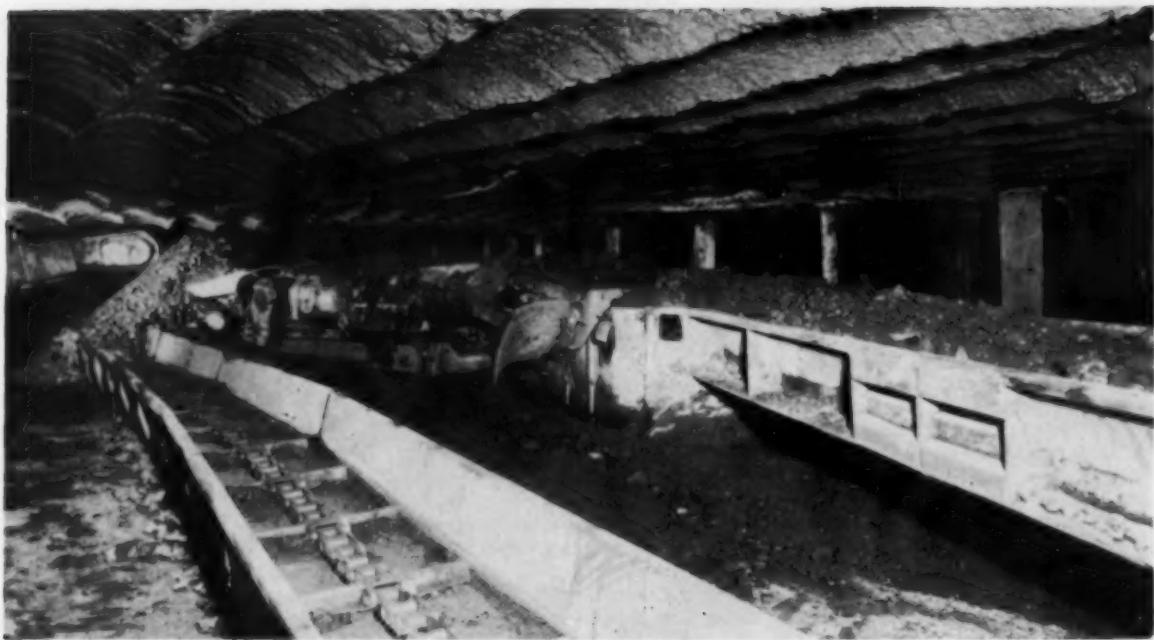
Sewells Point piers have a draft of 35 ft and can handle almost any size vessel. Ships hauling 18,000 tons have been loaded in recent months at these facilities.

If port congestion occurs, it is temporary or of a minor nature. In extreme cold weather (which is very seldom), frozen coal might delay dumpings. Late ship arrivals during winter months—usually due to storms

in the Atlantic—are considered unavoidable. There is practically no labor trouble.

The Virginian also reports no delays in car arrivals and turnarounds (except for those caused by small operators shipping mixed grades which require more classification time). The addition of storage tracks mentioned above—bringing present yard capacity to 6,000 cars—has greatly facilitated classification. Complete conversion to diesel locomotives has improved turnarounds by 50%—haulage from mines to Norfolk is now consistently on a 48-hr basis, time in transit.

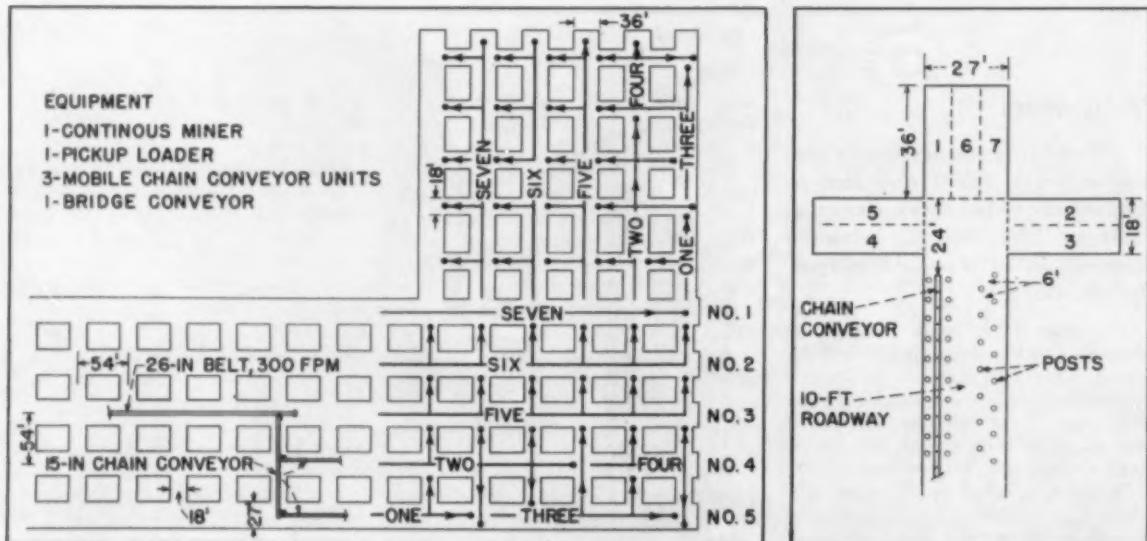
No shortage of cars is anticipated in 1957 or 1958. The road has 2,800 70-ton hoppers on order, all of which are expected to be in service by the end of this year.



PICKUP LOADER follows continuous miner as it advances into coal. Unit permits miner to operate continuously in event of short transportation delay. Bridge conveyor links loader to chain conveyor.

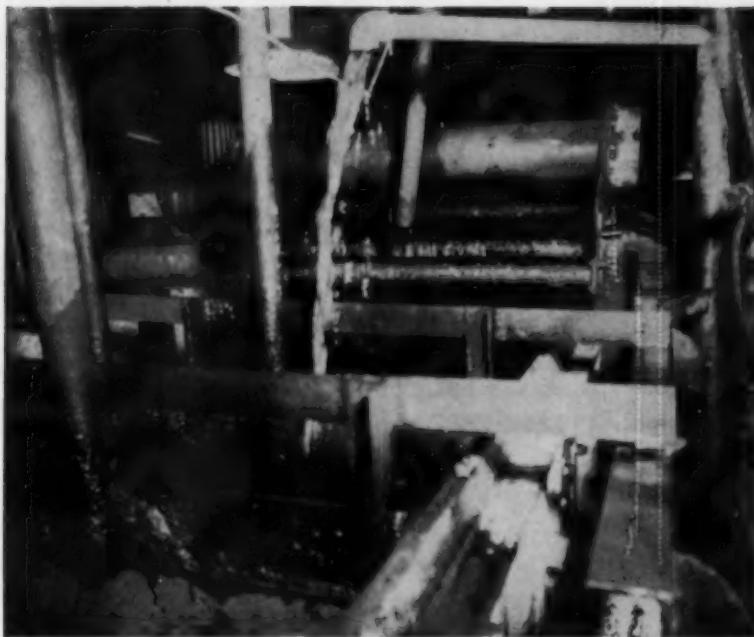
Continuous Face Haulage, New

Continuous miners, bridge and chain conveyors provide steady flow of coal in well coordinated mining plan. New-type compact heavy-media washer upgrades 200 tph of coal, yielding product with 5.8% ash.



MINING PLAN with continuous miner, pickup loader, bridge and chain conveyors is designed to keep equipment moves to a minimum in thin coal.

MINING sequence in heading shows successive cuts in 36-ft advance.



BUILT-IN DRAIN SCREEN is an integral part of new heavy-media washer. Unit removes 95% of magnetite from coal for recirculating within washer.



SUPERINTENDENT Gordon L. George directs operations at Wyatt-Seanor.

Washer Mark Wyatt Expansion

By A. E. FLOWERS
Associate Editor, Coal Age

STREAMLINING underground operations to improve efficiency, and adding a new heavy media washer to prepare a quality product are two recent major achievements in a modernization program at the Wyatt-Seanor Coal Co., Eskdale, W. Va.

Opened by the Wyatt Coal Co. in 1948, the No. 2 Gas mine has progressed through various stages of modernization. Up to 1955, conveyors, loaders and duckbills were employed. In that year two sections of off-track mobile equipment were added. One section used a Jeffrey 76AM Colmol, Joy 14-BU loader and two Jeffrey shuttle cars. The other employed a 14-BU loader, two Jeffrey shuttle cars, 35BB cutter on crawler truck and a Chicago Pneumatic drill.

In April, 1956, the Wyatt Coal Co. was acquired by the Simpson Coal & Chemical Corp. and renamed the Wyatt-Seanor Coal Co. Shortly thereafter the new owners took steps to increase production and improve the quality of the finished product. To provide continuous section haulage

from the Colmol, the company added three Long M500G chain conveyors. To boost mine capacity to 2,500 tpd, the company added two Schroeder hydraulic handheld coal drills, one Joy 14-BU loader, three Long M55G Mobil-Head chain conveyors, one Jeffrey Colmol and two Joy 11-RU universal cutters.

Since existing preparation facilities were not designed to handle the planned boost in output, the company laid plans to make additions and changes at the same time the underground equipment was ordered. After thoroughly studying the problem in the No. 2 Gas mine and considering the possibility of mining and washing other coal beds on the property, the company selected a heavy-media washer. On Sept. 25, 1956 the company signed a contract with Fuel Process Co. for a heavy-media plant to handle 200 tph of raw coal. Heart of the new washing facilities is a new Fuel Process M6 heavy-media washer. Features of the new washer are as follows:

1. Integral vibrating screen designed to remove heavy media from the coal so that about 95% of magnetite may be recirculated within the

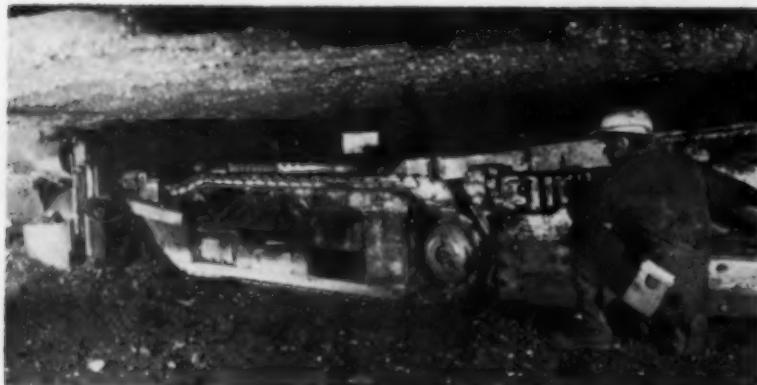
washing vessel for immediate reuse.

2. Built-in low-head, high-volume, low-speed media circulators that use little power. About 5% of the heavy-media solution flows over a weir from the circulating chamber of the washer to the media sump and is recirculated through the washer by a heavy-media pump. The heavy media sump provides a reserve for operating the washer and ensures a constant level of solution in the washer, regardless of feed.

3. Flow-distributing device which can be adjusted to provide a uniform density throughout the solution in the washing tub. The purpose of this is to prevent blocking of the chamber by near-gravity material.

4. An automatic valve controls the quantity of water returned to the washer by the magnetic separator. This maintains a constant specific gravity in the solution. The volume in the medium sump is maintained within a 5-gal range.

5. Desliming sump. To keep down settling-pond maintenance, decanted water from the tank is used as a primary rinse for coal and refuse. Coal fines in the bottom of the sump are removed by a solids-handling pump and delivered to a horizontal



CONTINUOUS MINER, teamed with pickup loader, bridge and chain conveyors, sets the production pace. Average output is 400 tons in 42- to 48-in. coal.



FLEXIBILITY of equipment is shown with bridge conveyor and pickup loader on right side of panline and continuous miner in 90-deg crosscut to left.



MOBILE HEAD for chain conveyor permits faster moves to new locations after continuous miner completes advance.

vibrating screen equipped with $\frac{1}{4}$ -mm stainless-steel woven-wire screen cloth. The plus $\frac{1}{4}$ -mm solids are removed and dropped into the $\frac{3}{8} \times 0$ slack or can be sent to refuse if it becomes

high in ash. But thus far this has not been necessary.

Mining is in the No. 2 Gas seam whose thickness ranges from 42 to 48 in. Rather firm shale or sandstone

covers the coal in most areas of the mine, but sometimes 4 to 12 in of draw slate is present. This is taken down in headings as the faces advance, but is supported in rooms if possible. Rolls in the roof sometimes cut down into the coal seam as much as 12 in and reduce equipment efficiency. The floor is hard fireclay which deteriorates readily when in contact with water. The general dip of the coal bed is about 3% to the northwest.

Continuous-Mining Plan

A typical continuous mining section is equipped with a Jeffrey 76AM Colmol, 14-BU loader, Long PT15 Piggyback and three Long M500G solid-bottom chain conveyors. This equipment is operated by seven face men whose jobs are as follows: one Colmol operator, one 14-BU operator, three face utility men, one electrician and one foreman. One belt boom man handles coal from two sections. Thus a total of $7\frac{1}{2}$ men is charged to each section.

Wyatt-Seanor uses continuous miners in both entry and room work. In entry development, five headings are advanced on 60-ft centers with breakthroughs on 80-ft centers in the mains and on 54-ft centers in room entries to coincide with room spacing. Openings are made with two or more passes of the Colmol. For example, headings are driven 27 ft wide in three passes; breakthroughs 18 ft in two lifts; and rooms 36 ft in four.

Five headings, numbered consecutively from left to right, are driven in entry development. These are advanced according to a plan designed to keep equipment moves to a minimum. Mining proceeds as follows:

1. The No. 5 heading is driven 100 ft and a breakthrough cut to the left toward the No. 4 heading at the 54-ft mark. The Colmol, 14-BU loader and Piggyback then are moved to the No. 4 heading.

2. No. 4 heading is then advanced 200 ft and cut into the crosscut previously driven from No. 5. Breakthroughs are cut left and right at 108 and 162 ft as the miner advances.

3. Equipment is moved back to No. 5, which is then driven to a limit 300 ft from the starting point. As this advance is made, a breakthrough is cut into the face of No. 4 and across to No. 3 heading, and from No. 5 to No. 4 at a point 54 ft ahead.

4. Equipment is then moved into Nos. 3, 2 and 1 in turn. In Nos. 3 and 2 breakthroughs are cut to the left every 54 ft. The No. 1 heading is driven straight ahead for the full

300 ft, thus ending the cycle. After this full cycle is completed, a 270-ft belt extension is made in the No. 3 heading and the chain conveyors also are moved ahead.

Rooms are driven 300 ft in a similar manner. The first two rooms are advanced alternately to set up the initial fresh-air current and provide for easy ventilation of future rooms. Blind breakthroughs are cut from the second room toward the third room. In this way the ventilation circuit is established in the new room as soon as the miner reaches the previously driven breakthrough. The miner then stays in a room until it is driven to its limit and crosscuts are driven to the left toward the next room.

In addition to simplifying ventilation, Wyatt officials say that driving the blind crosscuts eliminates the problem of cleaning up loose coal that would be made if crosscuts were cut into completed rooms.

Details of the mining sequence are shown in an accompanying sketch.

In taking the successive runs to get the desired width, the Colmol starts at the left side, with the center line 6 in from the right rib, and advances 36 ft. The machine is pulled back and all carbide bits are rechecked and replaced if dull. While the bits are being checked, a row of posts is set in the first advance. Second and third lifts parallel to the first are made similarly.

When the third advance is made, the loader and Piggyback are moved back from the face and six pans are added to the conveyor line. It takes 18 to 20 min to extend the conveyor. All face men help to make the extension.

Mining Results

Best results at the No. 2 Gas mine with continuous miners, bridge conveyors and chain conveyors are obtained in rooms. Because of the wider place and smaller pillars roof pressure weakens the coal. As a result the continuous miner can bore into the face at a faster rate. Penetrating the coal at a rate of 24 in per min, the Colmol produces an average of 400 tons per shift, or 53 tons per crew man. The peak output was 532 tons, or 71 tons per man.

In heading development, where the coal is harder, the continuous miner produces up to 350 tons per shift. Average output is 300 tons per shift, or 40 tons per man. Penetration is 18 in per min.

The change from shuttle-car haulage to conveyors in continuous min-



TIMBERING PLAN requires straight posts to be set on 6-ft centers except in 10-ft roadways in center of working place.



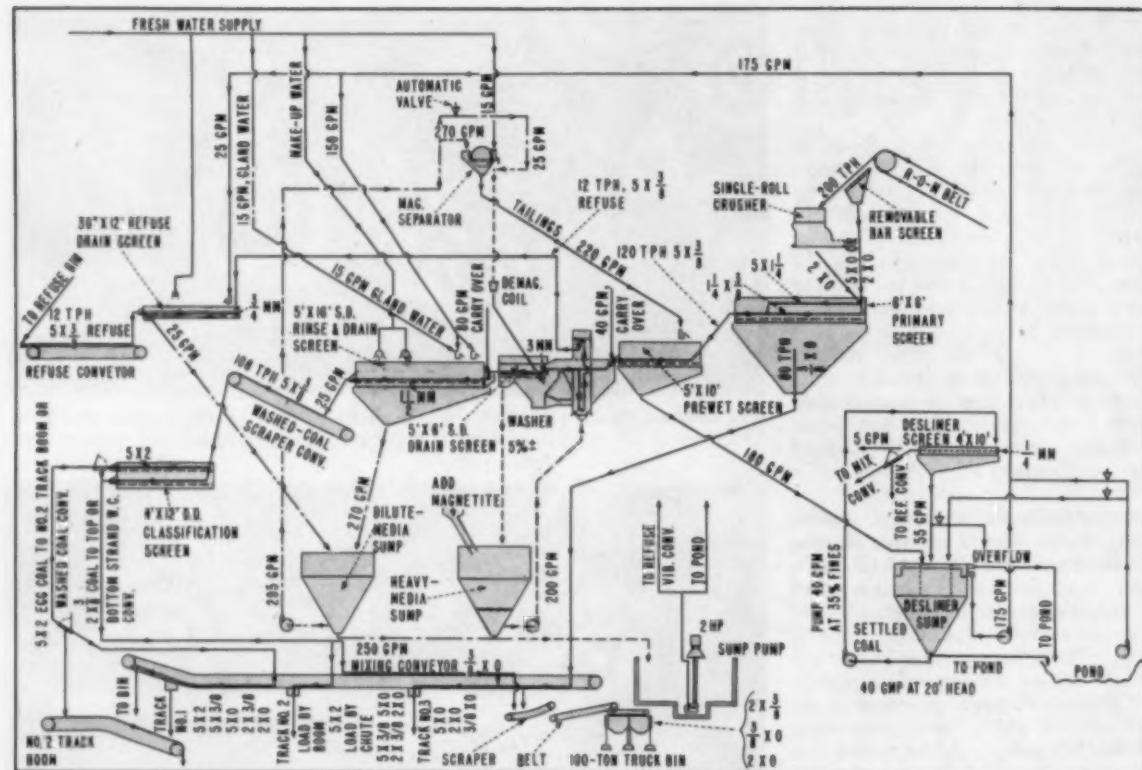
BRIDGE CONVEYOR links pickup loader to 15-in chain conveyor to complete continuous face haulage system. Discharge end travels on sides of panline.



DESTINATION of loaded mine cars is rotary dump at 200-tph cleaning plant. Coal haulers are pulled to surface in 34-car trips.

ing was made in July, 1956. In the preceding three months of April, May and June the continuous miner produced an average of 310 tons per shift in headings and rooms with shut-

tle-car haulage. In August, September and November, when mining conditions were similar to those in April, May and June, the continuous miner produced an average of 365 tons per



COAL FLOW is built around new heavy-media washer. Clean coal may be sent to railroad cars or delivered to bins.

shift. But the greatest increase was noted in room work where the continuous haulage setup permitted the machine to work more continuously in the softer coal. As a result of this study, the company tries to use the continuous machines in rooms as much as possible and conventional equipment in entry development.

Moving Face Equipment

Planned equipment moves play an important part in successful application of conveyors to continuous miners at Wyatt-Seanor. To make possible a maximum of working time on each of the two producing shifts, the company makes as many moves as possible on the third shift. Mining projections are designed so that under normal conditions equipment moves will fall on the third shift.

A special crew under the direction of a foreman moves face equipment and performs maintenance work on the third shift. Four men move all the equipment and two electricians make any necessary repairs and service the continuous miners. Routine servicing includes greasing, checking the level of the hydraulic oil and inspecting for worn or loose parts. A complete set of sharp bits also is

installed for the next morning shift.

After a belt extension is made in the No. 3 heading, the cross conveyor from No. 3 to No. 5 and the conveyor in No. 5 are moved up and set so that mining can start immediately on the first shift. The Colmol advances the No. 5 heading as shown in the mining illustration in two shifts. On the third shift, the third chain conveyor is moved from the old location to the new point in No. 4 and extended 74 ft. The moving crew at the same time moves the continuous miner, loader and bridge to the No. 4 heading so the day shift can start loading immediately. From then on the moving crew only takes in supplies, brings up pans from the previous setup and extends conveyors in Nos. 4 and 5 headings.

After Nos. 4 and 5 headings are driven 324 ft, or six crosscuts, the continuous miner is moved to No. 3. The No. 5 heading is completed first and as soon as it reaches its limit on the second shift, the moving crew removes the chain and sets it up in the No. 3 heading. Two shifts of mining in No. 4 are available to complete the move from No. 5. Pans near the face of No. 5 are taken through the crosscuts to complete No. 4.

When No. 4 is completed, the third

shift moving crew transfers the Colmol, loader and Piggyback to No. 3 heading. On the following third shift the crew moves the conveyor drive and pans from No. 4 to No. 2. When No. 3 is completed, face equipment is moved to No. 2 and the conveyor drive is moved to No. 1.

While Nos. 1 and 2 headings are being driven, the belt is extended on the third shift. This completes the cycle of a complete advance across the five headings.

Occasionally it is necessary to move the continuous miner, loader and bridge conveyor between the day and second shifts. This move is made by the day crew at overtime rates.

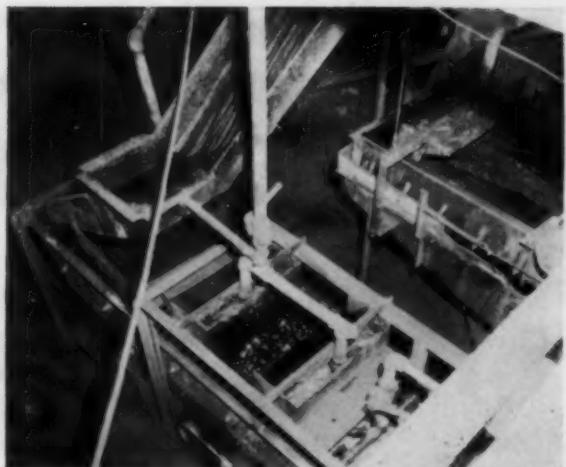
Haulage and Power

Coal from the sections is carried to loading stations by panel and mother belts, including Jeffrey 26-in units and a Goodman 30-in mother belt receiving coal from one continuous miner and one conventional section. These conveyors discharge into 3-ton mine cars.

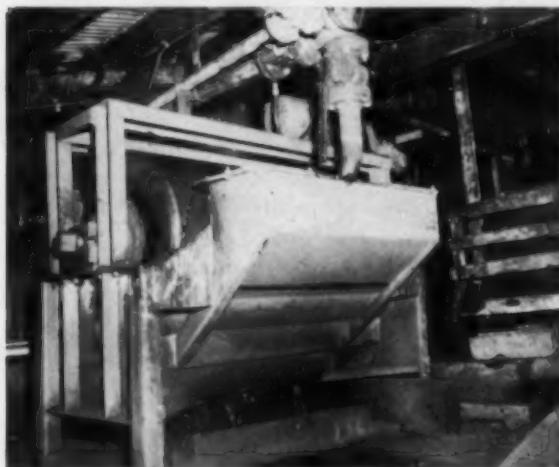
All underground equipment operates at 550 v, DC. Energy is supplied by two 750-kw substations located on the surface. A General Electric unit serves one continuous unit and a conventional section. A Westinghouse ro-



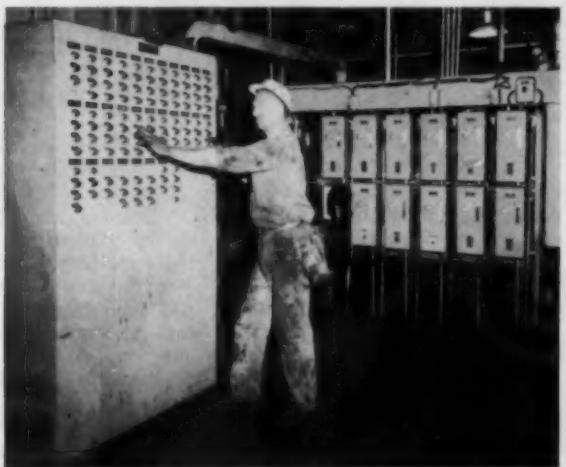
PREWET SCREEN receives 5x% coal from primary vibrator screen and feeds 120 tph directly to washer.



DEWATERING and draining of refuse and settled coal from deslimer sump is assigned these vibrators.



MAGNETIC SEPARATOR concentrates magnetite pumped from dilute-media sump and returns it to washer for reuse.



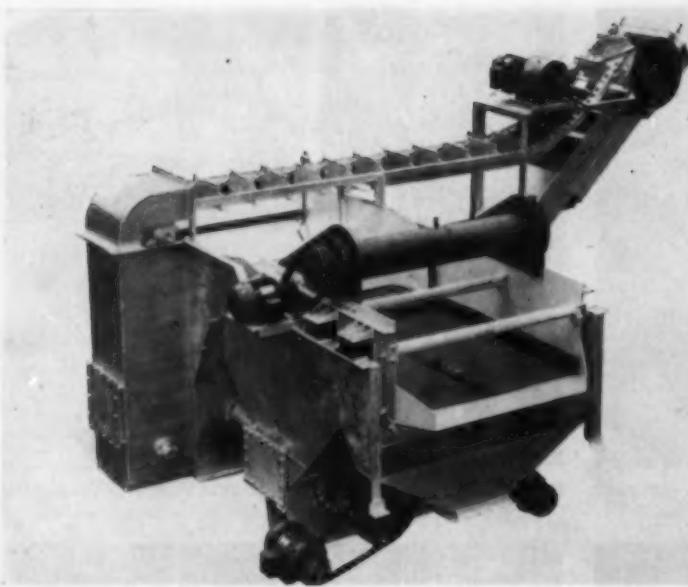
CENTRALIZED CONTROL simplifies operation of preparation facilities. Only two men are needed to run plant.



RINSE AND DRAIN SCREEN removes last of media and water from washed product before it drops to conveyor.



DESLIMER SUMP receives fine coal washed out on prewet screen. Settled coal is pumped to vibrator.



OVERALL VIEW of new dense media washer shows built-in drain screen as integral part of unit. Conveyor removes refuse.

tary converter provides power for the haulage, one conventional section and the second continuous miner.

Roof Support

All timbering is done by the face crews. Because the roof is generally good straight posts with cap pieces are sufficient support. Safety timbers are set as the face advances and permanent posts are set on 8-ft centers. In a 27-ft heading timbers are set as follows: one row of timbers is set 4 ft from the left rib near the conveyor which is 3 ft left of the center line; another row is placed along the opposite side of the conveyor; a 10-ft roadway is left and then two staggered rows of posts are set along the right rib.

Preparing the Coal

Mine cars are emptied by a rotary dump that feeds onto an elevating belt leading to the top of the plant. There it discharges onto a removable bar screen which may be set to remove either 5x0 or 2x0. The oversize product passes to a McNally Pittsburgh 30x36 single-roll crusher which reduces it to 2x0 for remixing with the through product from the bar screen. The combined sizes then discharge onto a 6x16-ft double-deck Lecco vibrator that removes the 3x0. The 3x0 flows either to the mixing conveyor for loading into railroad cars or to a 100-ton truck bin.

The 5x0 passes to a 5x10-ft single-deck Lecco prewet vibrator fitted with

a $\frac{1}{4}$ -in screen. Underflow goes to a desliming sump from which settled solids are pumped to a 4x10-ft Aerovibe screen equipped with $\frac{1}{4}$ -mm screen. Dewatered solids may be sent to the mixing conveyor or to refuse if the ash content should become too high. To date this has not been necessary. Vibrator underflow either returns to the desliming sump or may be sent to the settling pond. Clear water at the top of the desliming sump is decanted off and sent to a Gardner Denver pump that delivers it to a weir box on the refuse vibrating drain screen.

Prewet 5x0 flows into the new Fuel Process M6 heavy media washer which features a built-in 5x6-ft single-deck Lecco vibrating dewatering screen. The purpose of this screen is to remove heavy media from the coal so that about 95% of the magnetite may be recirculated within the washer by built-in circulators. Approximately 5% of the heavy media solution overflows from the suction chamber of the washer to the heavy media sump and is recirculated to the washer.

Another feature of the washer is a flow distributing device which can be adjusted to provide a uniform density throughout the solution in the tub. The purpose of this is to prevent blocking of the chamber by near-gravity material.

An automatic control device controls the quantity of water returned to the washer with the magnetite re-

covered by the magnetic separator. This is designed to maintain a constant specific gravity of solution. About $\frac{1}{2}$ lb of magnetite is used per ton of clean coal.

Rinsed and drained coal discharges to a scraper conveyor that carries it to a 4x12-ft double-deck Lecco classifying screen. There it is split into 5x2 and 2x0 fractions. The 5x2 drops onto the mixing conveyor which delivers it either to the No. 1 or No. 2 track. The 2x0 also passes to the mixing conveyor for delivery either to track No. 3 or to conveyors that discharge into the 100-ton truck bin.

Underflow from the rinse and drain screen flows to a dilute media sump. From there it is picked up by a Goyne centrifugal pump and delivered at the rate of 295 gpm to a 30x48 Dings magnetic separator. Approximately 25 gpm of the dilute media bypasses the separator via the automatic valve. Concentrated magnetite passes through a demagnetizing coil and returns to the washer. Underflow, or tailings, from the magnetic separator flows to a weir box on the prewet screen.

Washer refuse is delivered to a 2x12-ft refuse drain vibrator screen where magnetite is washed from it and sent to the dilute media sump. Dewatered refuse then drops onto a refuse conveyor which delivers 12 tph of waste to the refuse bin. From there it is hauled by truck to a disposal area.

Washer performance to date shows less than 0.4% of 1.50 sink material in the clean product and less than 0.3% float material in the refuse. The raw coal coming into the plant averages about 12% ash and contains 59% of 5x0 material. Clean coal from the washer contains 5.8% ash, which practically is the same as predicted from the washability curves. Composite ash of the washed coal and the raw 3x0 is 6.5%. The company reports that the moisture of the washed 5x0 coal has increased only 1% over that in the raw product.

Coal is shipped to customers either over the C&O RR or by barge via the Kanawha River. Coal for utility customers and chemical plants is usually shipped by the water route and coal for overseas shipment and some domestic users is delivered by rail.

Operations at the No. 2 Gas mine are under the direction of Gordon L. George, superintendent. Assisting him in carrying out his duties are E. A. Symonds, mine foreman; D. L. Peters, chief electrician; Roy Frizer, preparation foreman; M. A. Maynard, purchasing agent; and W. D. Pearson, office manager.



WITH NOSE CLIP IN PLACE, worker breathes through Self-Rescuer mouthpiece. Active material in the unit with a 30-min life, converts carbon monoxide to carbon dioxide.



IMPORTANT ITEM of personal equipment is the individual mask carried by this supervisor on his cap-lamp belt. This is especially vital among men who move about.

Underground Life Preservers

Self-Rescuers offer protection against carbon monoxide for underground workmen after fires or explosions. Instruct your men in the use, limitations and distribution of these indispensable safeguards.

AT SEA life preservers are available and passengers aboard ship are trained in their use in case of emergencies. Steamship companies hope they will not be needed, but we all know lives have been saved because they were ready for use. For the same reason Self-Rescuers are used in the mining industry for emergency protection against carbon monoxide in underground fires or explosions.

The availability of Self-Rescuers stored in strategic locations or carried personally by the miner affords security as he has protection for a period of at least 30 min during which time he can escape to an uncontaminated area or to where other Self-Rescuers or oxygen equipment are available.

As originally approved in 1924 the Self-Rescuer was sealed in a metal container. The container was redesigned in 1928 to a bracket type which simplified the removal of the Rescuer. As in the previous model, this Rescuer was so designed that it had to be discarded after use.

A completely redesigned Self-Rescuer which is currently available was developed and approved in 1950 incorporating the required features in a lightweight unit with a replaceable cartridge (Approval No. 1447).

OPERATING PRINCIPLE

The Self-Rescuer provides respiratory protection by converting deadly carbon monoxide to harmless carbon

dioxide. The hermetically sealed replaceable cartridge is contained in a flexible molded rubber body which also provides a means for the user to hold it in his mouth. There is a nose clip which, when attached to the nose, forces him to breathe filtered air through the mouthpiece. An adjustable neckband is also attached which prevents loss of the device.

The Self-Rescuer, while providing protection when properly used, has certain limitations. These are best set out in USBM Miners Circular 35, from which the following is quoted:

LIMITATIONS

"As indicated by its name, the self-rescuer is intended for use as a device



CACHES OF SELF-RESCUERS along haulageways can be opened by workers to assist them to portals.

Planned distribution and training are important



BOXES of masks may be installed on mobile machines to provide protection for the men working in face areas.



THREE STEPS in using the Self-Rescuer. All underground workmen should be trained for emergencies.

by means of which a person may escape from an atmosphere contaminated with carbon monoxide and is approved for that purpose only. It should not be used for entrance into a carbon monoxide-contaminated atmosphere, except to get to an uncontaminated area in a mine where a barricade might be built or to escape to fresh air.

"The only function of the self-rescuer is to protect the wearer against carbon monoxide. It will not protect against other gases or against atmospheres that are deficient in oxygen. A burning flame safety lamp indicates the presence of at least 16% of oxygen, which will support life.

The self-rescuer is a single-use device; that is, once used, it cannot be put back into its container for use again at a later date. Once the seal on the self-rescuer has been broken, the granular fill begins to absorb water vapor from the surrounding air and eventually will take up enough water vapor to "poison" the hopcalite catalyst and thus prevent it from converting carbon monoxide to carbon dioxide.

There is no stated limitation, as there is for universal gas masks, regarding the maximum concentration of carbon monoxide in which the self-rescuer may be worn. It is rather self-limiting in this respect, because the amount of heat given off during oxidation of carbon monoxide to carbon dioxide by the hopcalite catalyst is proportional to the concentration of carbon monoxide in the air in which the self-rescuer is worn. As described in connection with laboratory tests, approved self-rescuers have been worn in a 1% carbon monoxide-air atmosphere for 30 min by men performing a set schedule of exercise.

"During some early tests, BM-1402 self-rescuers were worn for as long as 70 min in an atmosphere containing 1% of carbon monoxide, but when they were worn in an atmosphere containing 2% of carbon monoxide the wearers had to retreat to fresh air after only 20 min because the temperature of the air entering their mouths became intolerably high. Hence, if a person wearing a self-rescuer notices that the air entering his mouth is extremely hot, he should know that he is in a high concentration of carbon monoxide."

DISTRIBUTION

Self-rescuers are available with plastic bags in a cardboard container, in a fiberglass individual carrying case, or in steel boxes containing six rescuers.

Due to the widespread differences in mine layout and operations, the

method of dispensing self-rescuers to the men varies in different mines. The ideal way is for each person to carry his with him at all times and some mines require this, checking each man before he enters. This is particularly necessary for men who are on the move throughout the mine.

Some mines store self-rescuers with the equipment that is moved each time the section moves forward. The quantity in each section is sufficient for the maximum number of men in the section.

For the protection of those individuals not in the section, many mines place a cache assembly of rescuers at various locations along haulageways, escapeways or at points where men would be working—such as underground pumps, substations or at the mouth of entries on the main haulageways.

At some properties in addition to self-rescuers being stored at fixed locations, it is the policy to have steel cache units containing six self-rescuers securely fastened to machines or locomotives to provide the men on or with the equipment this added protection.

TRAINING

Consideration might be given by the manufacturers of mining equipment to the provision of suitable built-in cases for carrying self-rescuers on machines such as cutters, loaders, and continuous mining-type machines, as well as on mobile mining equipment such as locomotives and shuttle cars.

As in the case of any equipment, the men should be thoroughly trained in the purpose, construction and use of the self-rescuer. The replaceable cartridge makes it practical to use for training purposes. It is particularly important that they are trained to use the neckband and nose clip and inhale only through the self-rescuer until they reach fresh air.

In addition to training in the use of self-rescuers, it is necessary that all the men are familiar with the approximate locations of the self-rescuers throughout the mine. These locations away from the sections or moving

Self-Rescuer is a Single-use device

Presence of heat in the mouth of the wearer is evidence that carbon monoxide is present in the air being drawn through the Self-Rescuer.

All men should be familiar with locations of Self-Rescuer caches throughout the mine.

Better still, all men should be provided with their own individual units.

equipment should be equipped with signs or lights so that they can be easily spotted in time of emergency. Reflectorized "Scotchlite" signs are becoming very popular for this.

For complete effectiveness, this training and instruction procedure should be followed through in training classes for the underground employees conducted by the supervisors at set intervals.

Although the self-rescuer is a relatively simple respirator, men who may have to use it properly to survive in an emergency should be trained in its use before the actual need arises. The construction and purpose of the various parts of the self-rescuer should be explained to them, and they should be strongly impressed with the fact that the self-rescuer is only for self-rescue from atmospheres contaminated with carbon monoxide and that they should never attempt to use it in atmospheres that are deficient in oxygen.

Men should practice removing the self-rescuer from either the cache case or the carrying case, removing the outer and inner covers, if the BM-1447 type is being used, closing their nostrils with the nose clip, putting the respirator mouthpiece in the mouth, and adjusting the neckband on the BM-1447 type. The same cartridge or self-rescuer may be used to train a number of men if the mouthpiece is disinfected after each man's use. Self-rescuers or self-rescuer cartridges used for training should be specially marked, and it should be emphasized to the trainees that self-rescuers used in training are not to be used for actual protection against carbon monoxide.

WEARER DISCIPLINE

It should be explained that, when the self-rescuer is worn in an atmosphere containing carbon monoxide, the air entering the wearer's mouth is warm and dry. However, the very presence of heat indicates that carbon monoxide is present in the air being drawn into the self-rescuer, and the self-rescuer should never be discarded because of discomfort from the hot, dry air. Furthermore, all inhaled air should be drawn through the self-rescuer. There is an unconscious tendency to sneak a breath or two of relatively cool air into the mouth by opening the lips, but it is far better to be alive with a hot or even blistered mouth than to be overcome or killed by carbon monoxide.

The dependability, ease of use by the men with minimum instruction and proven ability to save lives has made self-rescuers a must in any modern mining operation.



FIRST BIG SHOVEL, after reopening pits worked by smaller units, disposed of more than 2,000,000 cu yd of overburden in a single month on a faster average cycle than the smaller units and in deeper cover.

Report on Performance: How The Big Shovels Produce

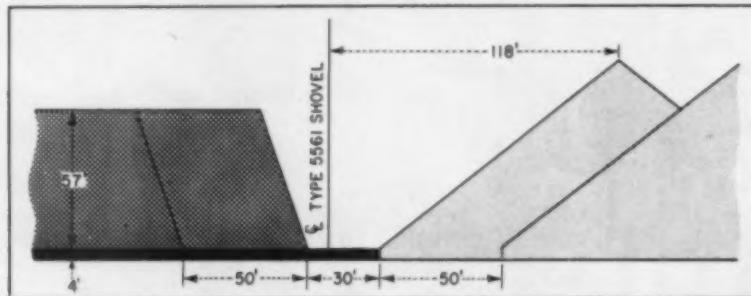


FIG. 1—WORKING RANGE of 45-yd shovel in normal pit conditions

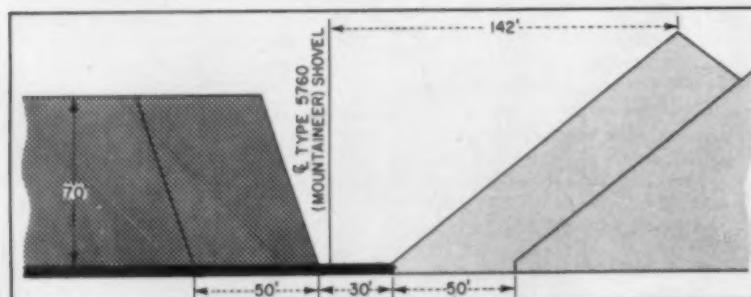


FIG. 2—WORKING RANGE of 60-yd Mountaineer in thicker cover

A faster cycle and higher hoisting speed in the new big shovels lead to higher efficiency in attacking higher stripping ratios. Greater range in spoil disposal increases recoverable coal. Mountaineer removed more more than 17 million cu yd in 1956.

CONSIDERABLE interest has been exhibited by many *Coal Age* readers in the larger and longer-range shovels now available for stripping. One such unit, the Mountaineer, swinging a 60-cu yd dipper on a 150-ft boom, has been in operation for more than a year at Hanna Coal Co., Cadiz, Ohio, and others in the same general class are now being erected or manufactured.

One of the questions frequently asked is what overburden depths these new shovels will spoil at how much greater depth than that handled by predecessors.

Stripping conditions vary from the level terrain of Illinois to the relatively steep slopes encountered in contour stripping in Kentucky, southeastern Ohio and western Pennsylvania. No definite answer can be given for either the new larger shovels or the former standard ones without knowing the conditions under which they operate.

In preparing the pit sections used as illustrations, the following factors were used:

Slope of highwall	1-to-3
Slope of spoil	1.25-to-1
Swell of spoil	25%
Thickness of coal	4 ft
Width of cut	50 ft
Width of coal-haulage berm	30 ft

PIT SECTIONS

The pit sections are based upon making straight cuts of equal width in overburden of uniform depth, and no consideration has been given to the influence of outside or inside curves on the depth of overburden that may be spoiled.

At many operations "trick" methods may be employed to handle deeper overburden with a specific shovel. Some of these are (1) locating the outer crawlers on spoil in the pit, (2) pushing back and making a nest for the spoil with the dipper or (3) cutting the spoil face at a steeper angle than that of normal repose. The sections shown here are not based upon using any of these methods.

Fig. No. 1 is a pit section being worked by a Marion 5561, equipped with a 120-ft boom and a 45-cu yd dipper, which is the standard front

end for this unit. When operating under the conditions shown, 57 ft is the maximum depth of overburden that can be spoiled by this machine.

Fig. No. 2 is a pit section being worked by a Marion 5760, the Mountaineer, making a 50-ft-wide cut in 70 ft of overburden. This is maximum spoil depth for the Mountaineer under these conditions.

Thus, for identical conditions in level country, the 5760 outstrips the 5561 by a 13-ft greater depth of overburden. It should be noted, however, that by proper planning of cut widths and by taking advantage of other favorable factors in contour stripping at the Hanna properties, both the 5561 and the 5760 have handled overburden depths considerably greater than those shown. The 5561 has stripped up to approximately 100 ft and the Mountaineer has disposed of overburden depths up to 120 ft. Therefore, shovel performance can only be assayed in terms of the conditions in which the shovel works.

MOUNTAINEER'S FIRST CUT

The situation was this: When the Mountaineer began stripping in early 1956 it faced the task of reopening old pits worked by 5561's in which all the coal had been loaded out. As explained in the April, 1957, issue of the *Groundhog*, a Marion Power Shovel Co. publication, the Mountaineer built its own roadway ahead of itself by casting spoil in the pit. This spoil was leveled by a bulldozer to a height of about 18 ft above the bottom of the coal. From this height and with all crawlers located on the spoil, the shovel made a relatively wide cut to within approximately 10 ft above the top of the coal, casting this material far over on top of the spoil from previous 5561 cuts.

The Mountaineer was then ramped down onto the coal to remove the remainder of the overburden from the seam for the entire width of the preceding part of the cut. The spoil from this operation was cast over as far as possible onto the spoil bench in the pit.

Part of the stripped seam was then loaded out with the Mountaineer following this loading operation to make the second cut. To cast the material

as far as possible, the crawlers on one side of the shovel were operated on spoil in the pit, the height of this spoil footing being at the level of the top of the coal. Another cut of coal then was loaded out leaving the normal 30-ft haulage berm of coal against the highwall. Thus pit operations were stabilized and this procedure will be followed until the Mountaineer reaches its stripping limit.

STRIPPING PERFORMANCE

Hanna Coal Co. engineers report the Mountaineer's production in 1956 as follows:

Month	Cubic Yards
February	1,081,224
March	1,037,415
April	1,101,339
May	1,567,721
June	1,565,837
July	1,776,367
August	1,632,467
September	1,820,875
October	2,074,376
November	1,799,611
December	1,604,862

In the first half of the year production was relatively low because of the problems encountered in reopening the old pits and in getting the big shovel and its crews working together. The yardage moved in October, however, is believed to be the world's record output for a month's operation by any shovel. The previous record, made by a 5561 in 29-ft cover, was 2,057,438 cu yd in January, 1955. The Mountaineer in making its record worked in cover averaging 75 ft in thickness.

As of January 1, 1957, the Mountaineer had removed 17,062,094 cu yd of overburden at Hanna Coal's operations.

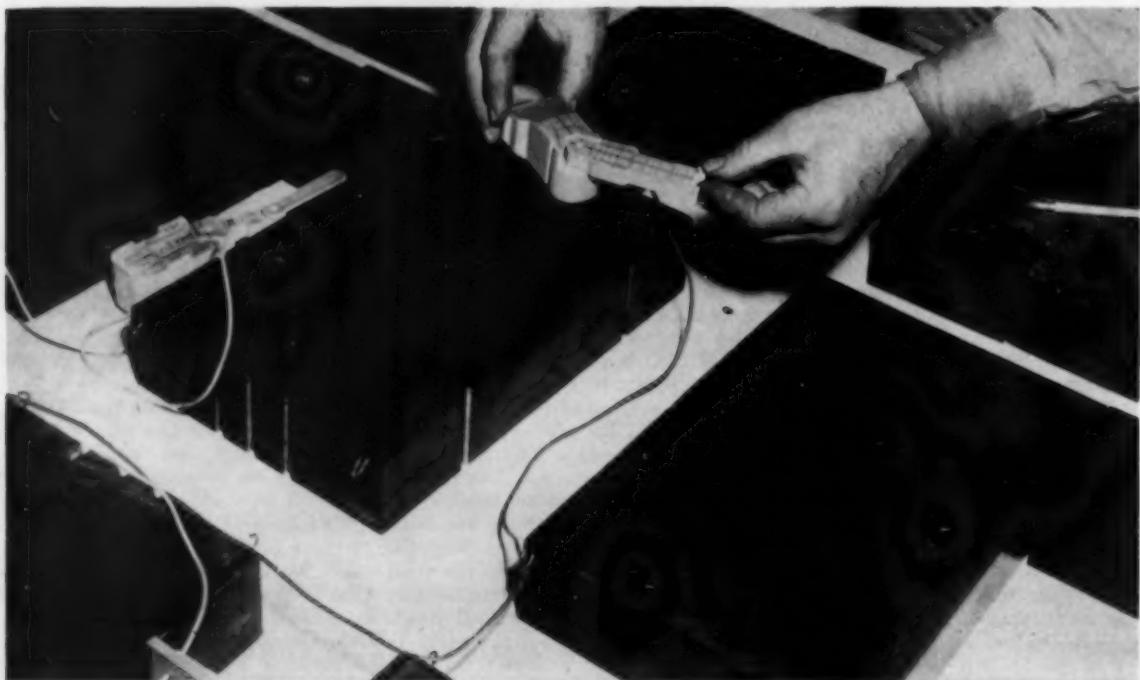
CYCLE TIME

In the 11 mo of operation in 1956 the cover handled by the Mountaineer ranged in thickness from 46 to 88 ft, with an average of approximately 74 ft. Average cycle time during this period was 57.63 sec, and average digging time was 83.46% of the scheduled operating time. During the same 11 mo, one of the 5561's stripped overburden in an average depth of 60 ft at an average cycle time of 65.8 sec.

Taking into consideration the difference in boom length, the overburden depths were relatively equal for the two machines. Therefore, the machines were operating under comparable conditions and the 8-sec difference in cycle times, in favor of the Mountaineer, is attributed to its faster swing and higher speeds in hoisting and lowering.



PRODUCTION MEN at U. S. Steel mines, Gary, W. Va., find that overall view of section aids in problem-solving.



FACE MACHINERY, like the cutter above, are faithfully scaled reproductions. Notice the trailing cables in the screw hooks along the rib. Smaller blocks in rear are used to add or remove single face cuts.

Trouble Shooting with Table Top Models

Miniature mine section layouts facilitate discussion and solution of underground problems

HOW IS IT POSSIBLE to discuss underground problems and try out proposed solutions without going underground? U. S. Steel Co. mines, Gary, West Virginia, have found one answer in building table top models which simulate layouts of mine sections.

The miniaturized section layout not only affords an overall physical view of underground problems but also makes their solutions more obvious. Trouble spots can thus be eliminated more quickly and savings in production time and money are almost certain to result.

When production men at Gary mines gather to discuss operating problems, sooner or later someone pops the question: "... sounds okay to me, but will it actually work out?"

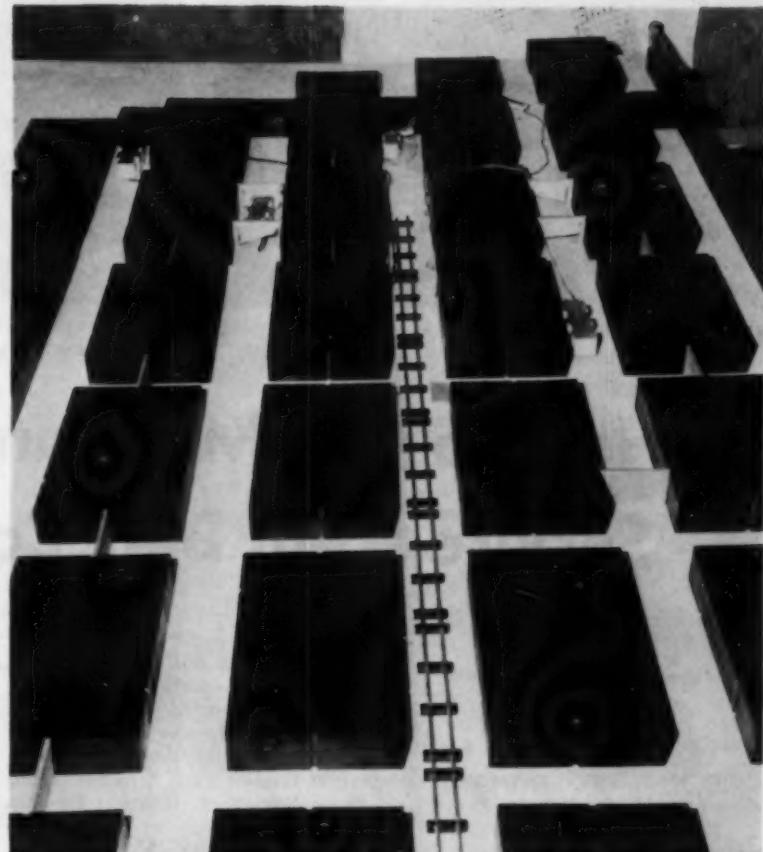
At this stage of the discussion, the men frequently move to the rear of the company classroom and gather around the large table shown in the accompanying pictures.

SETTING THE STAGE

On the table, a number of flat wooden blocks (made of plywood and painted black) are arranged in orderly rows to represent pillars of coal in a typical underground section. The miniature pillars, and the entries and crosscuts between them, faithfully reproduce in small scale the physical layout of a real section.

Toy train tracks indicate the haulage way, while ventilation stoppings and check curtains are represented by pieces of wood or cloth between the pillars. Scale models of various pieces of face equipment, complete with trailing cables running back to an imaginary power source, add a final touch of realism.

The net result is a regular working section from which the roof has been neatly removed to permit a comprehensive view of the entire working area.



PLYWOOD BLOCKS are arranged to simulate entries and crosscuts of a typical section. Complete set up includes haulage track, stoppings, check curtains and face machinery.

hensive view of the entire working area.

PURSUING PROBLEMS

The men gathered around the table continue their discussion while they tram the miniature machines through their cycles, add or remove cuts of coal, manipulate trailing cables and set up or remove stoppings and curtains. In fact, any movements can be made which are necessary to recreating the problem situation and to acting out proposed solutions.

The problem, for example, may involve trailing cables. Perhaps a shuttle car has been slowed down too often by snarled cables and a better procedure for attaching various cables

to the rib must be worked out to correct the situation.

Using the table top layout (and a few screw hooks), one system after another can be tried out and proved or disproved in a few minutes as the scale model machines are actually moved through their regular cycles.

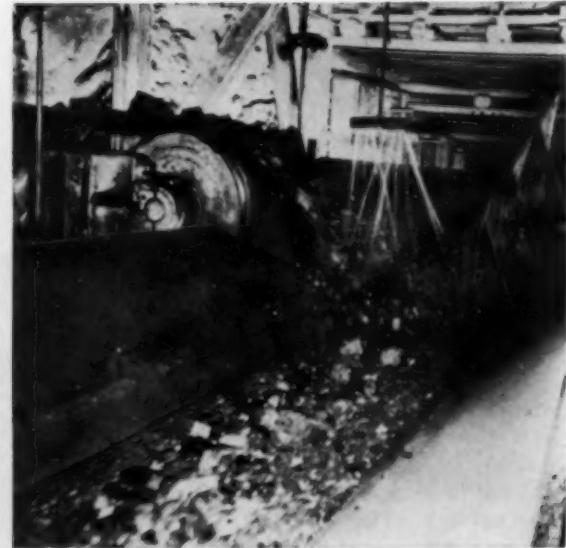
The table top model has also been used to illustrate the use of stoppings and check curtains, to show a new cutting machine operator the importance of getting the full depth on his face cuts, and for a wide variety of other problems.

Building table top models might be a worthwhile project for the all-around handyman at your operation, too.

Adapted from *Haulage Ways*, Ohio Brass Co.



SMOOTH TRANSFER of coal from one belt conveyor to another prevents spillage and possible belt damage.



EFFECTIVE dust suppression with water sprays at transfer stations keeps fine dust from accumulating.

How to Get More and Better Service from Belt Conveyors

By R. F. KNOBLOCH
Midwestern Belting Engineer
U. S. Rubber Co.

SELECTING THE BEST BELT for the job is only the first step in getting

your money's worth from your belt investment. This is a good start. But belts must be properly installed, maintained and inspected to get long life and smooth, safe operation. The following information, adapted from the U. S. Rubber Co.'s handbook "All About Belting" is designed to help

you get more and better service from your belts.

NEGLIGENCE IS WASTEFUL

Here are three case histories where careful belt selection, dollars and time were wasted because of negligence:

CASE 1 A slope belt carrying R-O-M coal from the mine to the tipple showed signs of excessive bottom cover wear. In addition, the belt stretched excessively and splice pulled apart. Belt engineers, from U. S. Rubber, called in to investigate, determined that these troubles were the result of incorrect starting. The belt had been started frequently under full load increasing belt tension and ensuing slippage that damaged the bottom cover. A stepped-acceleration starter, remedied the trouble.

CASE 2 A long replacement belt carrying coal overland to a preparation plant lasted only five months, while the previous belt had given 3 yr service. Investigation showed that proper idler lubrication had been neglected. Several idler bearings had frozen and the friction of the belt sliding over the stalled rollers abraded them, wearing sharp edges. The sharp edges slashed the bottom



PROPER INSTALLATION, good maintenance and regular inspection are basic ingredients for long belt life and smooth, safe operation.

Belt-man's Check Chart

Storage and Handling

- Store belts in an upright position.
- Store belts in a cool, dark place.
- In underground storage, coat belt edges with rubber cement. (Excludes moisture from plies if edges are worn or cover edge cracked.)
- Don't use steel bars to pry or move uncrated rolls.
- Be sure to roll crated and rolled belts in the direction indicated; i.e., same way roll is wound.
- Don't drop belts or crates.
- Don't flex belt to bends sharper than minimum pulley diameter.

Installation

- Inspect component parts thoroughly before installation:
 - Structure.
 - Pulleys.
 - Idlers.
 - Loading devices.
 - Other alignment equipment.
- Ensure alignment of head and tail pulleys, idlers, and structure.
- Lay belt out properly.
- Mount belt squarely on rod passed through center of core.
- Pull belt into position by block and tackle, winch, or similar equipment.
- Unwind belt by power equipment—from top of roll if belt is led onto troughing rollers, or from the bottom if led onto return idlers.
- As belt is unrolled onto pulleys and idlers, it must be kept taut to prevent excessive unrolling or telescoping. Sharp twists, bends and excessive hard pulling should be avoided to prevent high strain and tension on the belt.
- Unwind slowly. Be careful that the belt doesn't catch and that no kinks occur.
- Exert sufficient tension to tighten until the sag is taken out between return idlers with belt takeups in correct position.

Train Belt Properly

- Check return belt.
- Check tail pulley.

cover. A belt-man's lubrication and inspection chart was prepared and recommendations were rigidly enforced. As a result, belt life increased 25% above that of the original belt.

CASE 3 At a coal preparation plant, a belt carrying wet coal from the washers was spliced with me-

chanical fasteners. Moisture entered at a splice, causing deterioration of fabric and ply separation. A rayon-carcass belt was in use. Although quite strong under dry conditions, rayon fabrics have poor resistance to moisture. Belt engineers recommended a cotton-nylon replacement

- Check for deflection.
- Take necessary measures to ensure properly trained belt.

Loading Chutes and Discharge Devices

- Check for alignment.
- Ensure that belt does not rub against equipment.

Skirtboards

- Check for alignment.
- Belts must not contact metal or wood skirtboards.

If contact with belt is necessary, use rubber skirts. Do not use old belting for skirts.

Operation

- Use controlled starting as opposed to across-the-line starting. Avoid abrupt stops.
- Loading:
 - Uniform rate of speed.
 - Symmetrical load distribution.
 - Acceleration of material in belt movement direction.
 - Minimum angle between stream of material and belt.
 - Minimum drop of material.
 - Load fines first when possible.
 - Skirtboards. Dual skirting is recommended where possible.
 - Load at horizontal section of belt.

Control Discharging of Material

- Control trajectory of discharge.
- Trippers and plows.

Maintenance

- Periodic inspections of entire conveyor system.
- Alignment.
- Inspect for sharp edges, etc.
- Edge wear.
- Ensure proper lubrication.

Keep Belt Surfaces Clean

- Belt scrapers.
- Belt brushes.

belt. Cotton-nylon fabrics, of tensile strengths equal to those of rayon, are practically impervious to the effects of moisture. The replacement belt lasted 7 yr.

In each of the described cases costly repairs could have been avoided by proper belt care. Com-



FIRE EXTINGUISHERS should be located at points of possible fires.



ROCK DUST at strategic points near conveyors adds to fire protection.



CENTRIFUGAL SWITCH stops belt if speed is below normal.

pared with the results, only a little time and effort are needed to get long, trouble-free service from modern belts.

RECORDS PINPOINT PERFORMANCE

Belt service records provide an accurate picture of a belt conveyor's performance. They also provide the information for making an exact cost per ton analysis that may mean the difference between profit and loss. The true cost of a belt cannot be determined accurately until it is ready for replacement and all of the facts are evaluated. It is entirely possible that a high-priced belt giving long service is far more economical than an inexpensive belt having a short life.

Service records put all the operating factors affecting belt performance at a belt man's fingertips. They make it possible for him to predict the tonnage that a belt will carry, help him head off trouble and work out an effective inspection and maintenance schedule.

Selecting the proper belt also is simplified with the aid of service records. They indicate any changes that may be needed in a replacement belt. Although belt specifications can be developed independently of performance records, experience factors are always invaluable in choosing the ideal belt for a specific job.

By pointing out the causes of recent breakdowns, service records help reduce down time and maintenance costs. Operating data recorded now also will be useful if

conveyor additions or alterations are needed in the future.

Your service records give the belt manufacturer the vital information he needs to develop belting that will do a better job. When it comes time to replace a belt, belt engineers will have a firmer basis on which to make recommendations if they have all the facts on the worn belt.

Belt transportation underground offers the opportunity to reduce haulage accidents. In 1956, haulage accidents accounted for 77 deaths and were listed as the second most common cause of mine fatalities. Inadequate clearance and operation of haulage equipment accounted for a major portion of these accidents.

But the replacement of other haulage methods with belts cannot guarantee accident-free operation. One of the basic factors in implementing an accident-free program is a sound fire-prevention policy. A program to minimize belt conveyor fires can be separated into three main divisions: accelerated use of fire-resistant belting, fire prevention and fire protection.

FIRE-RESISTANT BELTING

Great strides are being made in the construction of fire-resistant belts. Manufacturers are making belts with neoprene covers, frictions and skims which have been accepted by the U. S. Bureau of Mines and given an acceptance designation. Several of the states have carried out independent tests on fire-resistant covers and given them approval where they passed the very rigid tests.

PREVENTING FIRES

An active fire-prevention program must be implemented and rigidly enforced. Some of the important factors in an effective fire-prevention program are:

1. Good housekeeping. Coal lumps, fines or dust must not be permitted to accumulate around the belt conveyor. Spillage should be removed frequently. Excessive spillage of lubricants must be avoided and consideration given to the use of higher flash-point and higher combustion-point greases and lubricants. Frozen idlers often result from neglect of housekeeping. And their possible failure to turn creates heat through friction which can cause lubricants to ignite.

2. Prompt repair of belt covers preventing the exposure of the carcass should be exercised. Any unprepared cover tears or gouges will lower the belt's fire resistance.

3. Pulley lagging should be constructed of fire-resistant compounds. Worn lagging should be replaced immediately.

4. When flexible or impact rubber idler rollers are used, they should be made of fire-resistant compounds.

5. Centrifugal switches should be installed. These shut power off on the entire belt system when the belt falls below normal speed. This prevents material pile-up because feeders do not continue to load a stationary belt.

6. Proper ventilation should be provided.

7. Proper installation of electrical equipment protected by overload relays. Power circuits should be pro-

Accident Prevention Check Sheet

General Precautions

- Provide for adequate clearance to ensure safe maintenance.
- Prohibit riding of belts by personnel.
- Use non-inflammable, non-poisonous cleaning fluids in splicing operations.
- Provide crossovers at sufficient intervals to eliminate the temptation to climb over moving belts.
- Provide a railing along belt walkway.
- Make sure personnel are clear of belt before starting it.

Drive Pulley Slippage Fire Prevention

- Install centrifugal switches. Check regularly.
- Install automatic takeups. Check regularly.
- Install emergency wire-pull and roof-fall cutout switches at strategic locations. Check regularly.
- Install chute pile-up paddle switch. Check regularly.

tected by current-interrupting devices, such as circuit breakers and fuses. Power lines must be large enough to carry normal load with enough reserve to accommodate reasonable overloads. They should be on insulators and kept free of combustible materials. Insulation on wires and cables must be made of fire-resistant compounds.

8. Conveyor structures, skirtboards, loading and discharge transfer devices should be made of fire-resistant material.

9. Periodic inspections regularly conducted are important. All deficiencies disclosed should be promptly corrected.

10. Belt should not be permitted to come into contact with conveyor structures or objects along the belt-line. Proper alignment and belt training can go a long way to prevent fire created by friction. And there will be less spillage.

11. A good communication system that provides contact among all main points along the conveyor system and other parts of the mine is an aid to both fire prevention and fire protection.

12. Installation of roof-fall cutout switches, side-limit switches and emergency cords running the length of the conveyor. Details on the installation and maintenance of these safety devices are available in a U. S. Bureau of Mines bulletin entitled Safety Aspects of Controls and Oper-

ations of Belt Conveyors in Coal Mines.

FIRE PROTECTION

If a fire should occur despite all preventive measures, the speed with which it is brought under control is of prime importance in saving lives and reducing property damage. Bureau of Mines Information Circular 7662, Fire Fighting Equipment in Coal Mines—Selection, Placement and Care, gives all the necessary information to provide adequate protection. Following are general pointers on fire prevention at belt operations:

1. In an all-belt mine, the main and gathering conveyors should be provided with water lines, hydrants or hose taps, fire hose, nozzles or a sprinkler system installed in accordance with N.F.P.A. specifications.

2. When fire-resistant belt is used, substitutes for waterline and sprinkler systems may be made in accordance with suggestions in U. S. Bureau of Mines Circular 7662.

3. Hand-type fire extinguishers should be located at each point of possible electrical fires, such as drive motors and circuit breakers. Suitable fire extinguishers fall into three classes: liquid carbon dioxide; dry chemical; and carbon tetrachloride. When used in a confined space where there is little movement of air, carbon tetrachloride extinguishers must be handled with extreme care.

The vapors are toxic; avoid breathing them.

The only sure way to ensure that fire-fighting equipment will be properly maintained is for mine management to institute a regular detailed inspection schedule. Instances where fire-fighting equipment was available but not operative or suitable are numerous, and sometimes resulted in tragedy.

Fire-fighting equipment should be inspected at least every 3 mo by qualified persons who thoroughly understand every device or material provided for fire protection. Any defects or shortages that may have developed since the previous inspection should be recorded and corrected immediately.

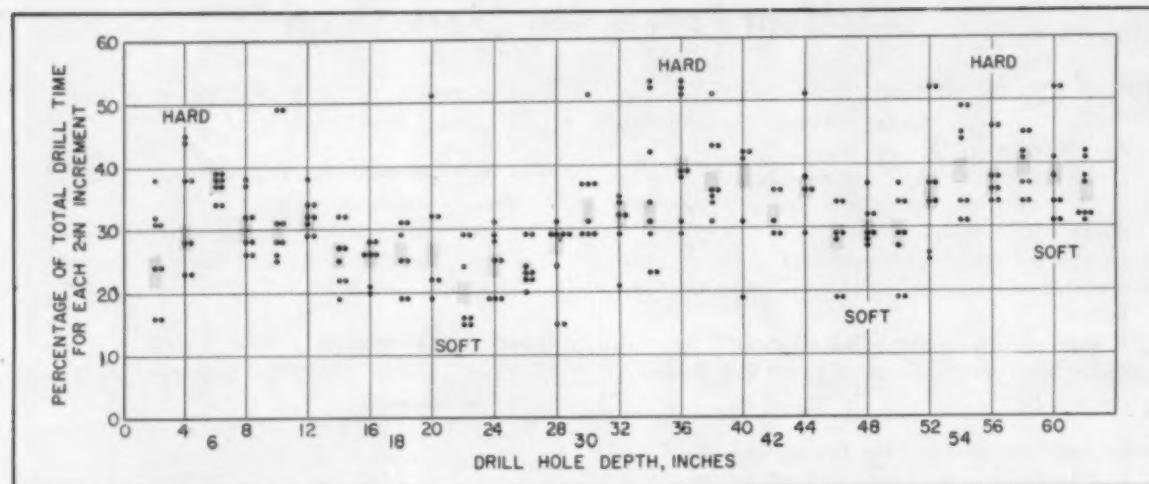
Every hand-type fire extinguisher should carry a tag indicating when it was inspected and the inspector's name or initials. Similar tagging of all truck-mounted facilities, hose stations, and miscellaneous fire-fighting items is recommended also.

In setting up good fire-protection measures, keep the following three points in mind:

1. Easy accessibility to fire-fighting equipment.

2. Provide more than two openings to ensure an escape route.

3. Proper ventilation. Too much air disperses the fine coal; too little will permit concentrations of noxious and explosive gases that can hinder fire fighting.



GRAPH DATA were plotted from eight drill holes. Two were studied in each of four headings. Although some of the points are missing the continuity of a curve remains. In plotting percent against depth, overlap points were plotted side by side to show concentration of points. By looking at each increment of depth and shading visually the average percentile area the points take on more of an appearance of a curve rather than a series of modes. Study of the graph above indicates that 42-in or 60-in bolts (hard stratum) would be worth more consideration than 30-in or 48-in bolts (soft stratum, according to the author.)

Take the Guess Out of Bolting A Roof

Industrial engineering and an idea for a shear type roof bolt are teamed by author Dan Shewmon to overcome the problems of proper bolt length and installation torque.

by D. C. Shewmon
Vivian, W. Va.

TWO OF THE MAJOR PROBLEMS that present themselves in roof bolting are proper bolt length and installation torque. If the two could be satisfactorily solved underground openings could be kept open for greater lengths of time.

Roof Bolt Length

One of the problems—the length of the roof bolt—is important because the greatest number of roof layers that can be properly tied together produce the strongest beam effect. Where roof-bolted areas fail the trouble sometimes can be traced to a roof bolt which is the wrong length and which has been anchored in soft, yielding rock incapable of holding the bolt's expansion chuck.

Although a long roof bolt ordinarily appears to be safer to install than a short one this is not always true. In many thin seam mines 36-in bolts are

doing a good job. Thus, it might be worth while to consider sinking 36-in bolts in coal 5 ft or more thick. In fact, shorter roof bolts might prove to be not only safer to use, but cheaper to use.

The best way to determine roof bolt length is to study the results of roof falls. During the study different rock strata can be examined and classified in detail. Yet, if a roof support program is a successful one, roof examination by studying roof falls is obviously unavailable as a means of study.

And, although there are various lines of equipment that can be used to inspect or measure drilled hole diameters, the equipment does not provide the answer to the problem of roof bolt length.

Possible Answer

One possible answer, however, may be in the correlation between the ability of rock to resist drilling and the ability of rock to resist deformation by a roof bolt expansion shell.

A stratum which will crumble around a shell, permitting the shell to slip and lose tension, or even to slip enough to free the shell, would be very easy to drill. Conversely, a stratum hard enough to resist the expanding action of the shell would be harder to drill. This phenomenon may not hold true all the time but should be true most of the time.

Measuring roof bolt hole drilling speed can easily be done in 2-in increments. The drill speeds of each 2-in increment could be plotted against hole depth, and the hard and soft roof layers then located. If enough drill speed versus depth data were taken in any given area and plotted on the same graph, a definite conclusion could be drawn then pertaining to proper roof bolt length. How often the data would have to be checked would vary with each property and with the importance of keeping the roof intact.

Plotting drilling speeds against hole depth has one drawback, however. Drill speeds vary not only with the

hardness of the rock, but with changes in air pressure, bit condition, drill condition, and attitudes and techniques of the drillers. The latter changes can be prevented by good relations between the miners and the time study men, or at least by a simple explanation of the reasons for conducting a study.

Most of the other variables mentioned can be overcome by converting the drilling speed of each timed segment to a percent of the total time needed to drill the entire hole. In this way the only variable which can affect the results is one which is changing during the drilling of an individual hole. By studying a number of holes in any one area this trouble is overcome. In this way rock hardnesses are found which are relative to each other and can be identified. Even rock strata might be identified this way.

Study Method

The study of drilling can be done easily by one man using a stop watch and a time study board and sheet.

Each 2 in of drilling can be timed separately, snapping the watch hand back to zero after each 2 in. Or the watch can simply be read and recorded as running time. If any particular increments are missed on any hole, the other readings are still worthwhile.

The actual study can be conducted without slowing down the rate of bolt installation. The simplest way to measure 2-in increments of drilling is to have the driller hold a roll-up steel pocket rule between the drill chuck and the roof. A reading is taken as each 2-in of rule rolls into the rule case. Special testing drill steels alternately painted black and white would be very handy. But missing a 2-in increment would mean the end of the data on that particular hole if there were any confusion concerning the depth of any increment. But this shouldn't happen very often. Studying a few holes in each face of the entries being driven and producing 6 to 12 sets of drillhole data should be sufficient for any one area.

If the observer has a pocket slide rule the data can be taken, calculated and plotted right on the section. Bolt length changes could be discussed with the foreman. The calculations need not be checked for degree of accuracy or an occasional mistake because the purpose of the study is to obtain an overall picture of roof conditions.

In plotting percent against depth, if points overlap they should be plotted side by side in order to show any concentration of points (see



BY MEASURING drill penetration speeds and preventing other drill speed factors from varying, soft and hard strata can be detected. The knowledge is then used to determine the length of the bolt.

graph). By looking at each increment of depth and visually shading the average percentile area, as shown in the accompanying graph, the points take on more of an appearance of a curve rather than a series of modes.

If a graph of drilling was inconclu-

Study Table of Drilled Roof Bolt Hole

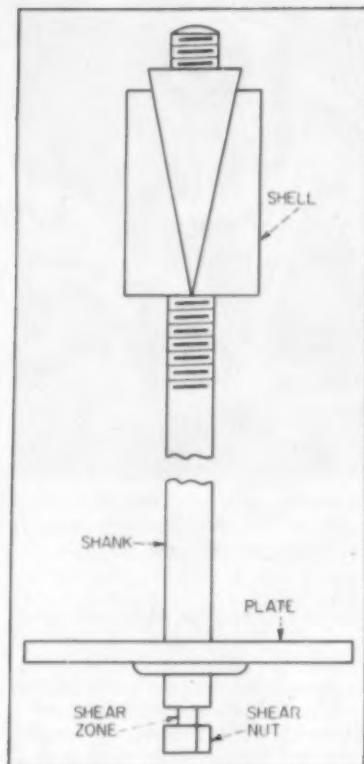
Hole Depth in Inches	100ths of Minutes	Percent of Total Drill Time
2	5	1.6
4	7	2.3
6	12	3.9
8	8	2.6
10	15	4.9
12	10	3.2
14	10	3.2
16	8	2.6
18	6	1.9
20	10	3.2
22	5	1.6
24	6	1.9
26	7	2.3
28	9	2.9
30	9	2.9
32	10	3.2
34	7	2.3
36	12	3.9
38	11	3.6
40	13	4.2
42	11	3.6
44	11	3.6
46	9	2.9
48	10	3.2
50	6	1.9
52	16	5.2
54	15	4.9
56	11	3.6
58	14	4.5
60	16	5.2
62	10	3.2
Total	3.09 min.	100.0%

sive in a given area, then roof stability would be a function of roof bolt length, other factors not being known. By reasonably frequent study of drill speeds, by keeping roof-bolting crews informed of the results, by noticing color and texture of the drill cuttings relative to the graphs obtained, correct bolt lengths can be used where it is important to keep underground roofs intact for an appreciable length of time. The drill crews and foremen, by noting drill speed with the naked eye and watching drill cuttings color and texture, can be insurance against improper bolt length between studies.

Roofbolting Torque

Once the most practical roof bolt length has been determined for a given mine area, the bolts can be tested by established procedure to determine what torques are best suited for installing the bolt. From this point on, however, there is considerable controversy. For the miner has yet to have available a positive way to know when he has installed the bolt with the particular torque found best by torque test.

Under ideal situations with equipment in first class condition and operated by conscientious men who have time to do their job right, bolts could probably be set with proper torque within acceptable limits. However, it is often lightly said that if there is any way that can be found to get a piece of machinery out of adjustment, a miner will quickly find that way. Also, in a mine where immediate bolting is of paramount importance, especially where roof cutters are present, miners are many times more interested



SHEAR TYPE roof bolt would have two heads and shear zone.

in their own immediate safety than they are in whether the roof will stay up beyond the shift's end. In entries driving down dip and containing mud or water at the faces, it is difficult to keep any kind of equipment running, let alone keep it in adjustment. With mechanical wrenches, a miner has a natural tendency to feel that the longer he twists the bolt the more properly it is being set. Many a time-study man has undoubtedly timed a miner tightening a bolt for over a minute or until the wedge or plug reached the end of the threads and the bolt head began twisting off the shank. It is common to see hydraulically operated bolting machines thrown into high speed repeatedly and then once for good measure. When the miner is asked how he knows when to stop turning the bolt, the reply is either, "Don't ask me", or "You get the feel of it with experience".

New Type Bolt

A bolt should be designed to be applied only by proper torque, whether or not the equipment is in shape, the operator conscientious, experienced, or in a hurry. In those openings which must remain open year after year such a bolt would be in great demand.

And such a bolt would be possible

if it were designed with two heads, between which lay a particular diameter shear zone designed to fail in shear at a particular torque. If the two heads were square and set 45 deg to each other, a square chuck wrench could twist off the first head, and leave the normal head of the bolt in place and intact. The sheared zone could be forged or turned. It and the shear head could also be separately made in a screw machine and screwed to the bolt proper. The simplest method yet considered is to spot weld on to a regular roof bolt a cold-made bolt blank that has not been threaded. This could be done in one operation, and the idea is on file. A machine designed for this operation would have a circularly rotating slotted head from which bolts of varying lengths would hang. A welding gun is now available to weld the shear heads to the regular bolt. Cold-made bolt blanks would be desirable because of their uniformity.

In addition, a bolt available in two or three torque valves is conceivable. Such a bolt could be set by the most inexperienced miner, whether in a hurry or not, using equipment in poor condition. A bolt so installed would be set with a torque valve which, even if varying by 10 or 20% would insure a securing mine roof in the best ways now practical.

Summary

Occasionally the choice of proper roofbolt length is obvious. Where the choice of length is not so certain, time studying roofbolt drilling and analyzing the results may show that one bolt length is better than another. The analysis is based on the supposition that rock which better resists drilling will better resist the expanding action of a roofbolt shell and the crumbling of the hole walls allowing shell slippage. By measuring 2-in increments of drilling time and plotting the time expressed as a percent of the total drill time against depth, a chart or graph can be constructed showing the relative hardness of the various roof strata. This graph is little affected by mining equipment conditions or by the skill of the drillers. The location of high percentage areas or peaks on the graph is indicative of the more desirable anchor points

for installing roof bolt shells.

To properly anchor a roof-bolt maximum torque must be applied to put the bolt in tension for it to bind roof strata together. Yet this torque must not expand the shell enough to rupture the rock surrounding the shell, or to produce enough tension to pull the shell out of the rock surrounding the shell. The proper torques necessary to set bolts might be divided into three groups: between 50 and 100-ft lb, 100 to 200-ft lb, and over 200-ft lb. These groups roughly correspond to the torques needed for shells situated in soft rock, medium soft rock, and hard rock. It is possible to make a bolt having two heads and a shear zone between heads so that when the bolt is first being installed the wrench engages just the first head, twisting it off at the shear zone when the proper torque valve

for setting the bolt has been exceeded. The bolts might be manufactured to fit three values of torque—low, medium, and high. The three bolts would be used only in those mine areas where the permanency of the opening is of utmost importance. Examples of openings where the roof or walls must remain intact for long periods of time are: underground storage rooms, main entries, and bottoms. In installations such as these the cost of the roof bolts is of little concern compared to the total investment. Yet the type of roof bolt is of vital concern. In mine openings, a roof bolt with a special shearing head would aid in securing the roof over rectifier and underground hoists installations, repair and supply shops, mainline haulage tracks or conveyors, shaft walls and stations, and inaccessible long life airways.



Cinderella, West Virginia

**87,895 tons of coal in eight months
at a bit cost of \$.0213 per ton**

Kennametal* U8C Cutter Bits set this record while mounted on a Model 28, 44-inch head Compton Auger operated by the Sycamore Coal Company. Superintendent Jack Kent reports about 25 tons of coal recovered from each of the holes, bored to a depth of 60 feet.



Clairfield, Tennessee

**27,000 tons of coal in two months
from 30 Kennametal Bits**

Cedar Hill Mining Company mounted Kennametal U7 Bits on a 15 Bit McCarthy Auger to cut outer clearance, and U10 Bits for straight ahead and inner positions. A 6" Kennametal SD Strip Bit acts as core breaker. Partner Herman Selvey reports 27,000 tons of coal mined in two months with no bit regrounding necessary. Holes were drilled to a depth of 125 feet.

KENNAMETAL CUTTER BITS

cut costs of High Wall Auger Recovery

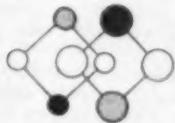
Long bit life is especially important in auger type recovery, due to the drilling time lost in pulling the auger head. On these two jobs, and others, Kennametal bits are helping to maintain high production rates by staying sharp to the end of the hole, time after time, for long production runs between regrounds. In addition, the free cutting design

* Trademark

of Kennametal Bits requires less power and puts less strain on the drill.

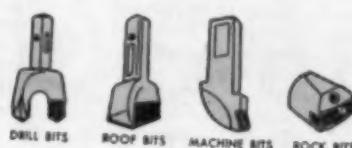
Ask your Kennametal Representative to help you select and actually test the Kennametal Bit designed to match your operating conditions.

KENNAMETAL INC., Mining Tool Division, Bedford, Pennsylvania.



INDUSTRY AND
KENNAMETAL
...Partners in Progress

C-3058



FOREMEN'S FORUM

The Three C's: Cooperate, Compete, Compromise

Reasonable relationships among crew members assure effective performance. The boss and workers must know when and how to cooperate, when and whom to compete with and when and why to compromise.

MANY OF OUR PATTERNS of adult behavior are reflections of our childhood experiences. We become mature not merely by accumulating experience but by assimilating it and making it work for us. Watch a group of youngsters at play. The very young are quite selfish. The first three words out of the petal-like lips of a toddler are most likely to be, "Mommy, Daddy, Mine." And he is quite willing to wrestle any other toddler for possession of the fluffiest blue bunny in the toy chest, no matter who it belongs to.

But all of us crave companionship, and before long the youngest learn that unreasonable possessiveness in "things" leads to a loss of friends. Thus he learns one of his first big lessons—he must cooperate if he is to have rewarding relationships with others. These relationships are of tremendous importance to all human beings; we soon learn that willingness to cooperate is a small price to pay for them.

Now our young subject grows in stature and strength to find the wonderful world of games and athletics opening to him. He is about to have his first lesson in the second C, competition. Among civilized people this is not an unfettered, dog-eat-dog fight for survival. Our concept of competition recognizes the necessity of having certain restraints in respect for the rights of others.

The Little-Leaguer, headed for the practice field with bat on shoulder and pocketful of bubble gum, is taking his first steps toward development of his talents. He will move on from baseball to other pursuits, growing as he goes, until he finally comes to a point in life where he takes his talents to the marketplace and trades them for a livelihood. (We assume his elders have taught him that there is a balance between service and remuneration.)

He now has one more lesson to learn. Compromise, the third C, is sometimes

necessary in living with others. Unwillingness to seek grounds for compromise is mighty wasteful of valuable time. The cow of opportunity flits while two bull elks stand head-to-head with antlers locked. We learn sooner or later that in certain situations of stalemate we must swallow pride, subdue stubbornness and give in a little on both sides in order to get on with the job.

Those are the three C's. The youngster must learn them and all of us must apply them. If we refuse to apply them, we cannot properly relate ourselves to those with whom we live and work. The effective supervisor is one who understands the interplay among cooperation, competition and compromise.

He cooperates with his workmen in a sincere effort to help them become better at their jobs; he cooperates with his own superiors by trying to understand their problems and to do his best to alleviate them, and he cooperates with his fellow supervisors to insure the success of the total enterprise.

He competes with himself. Competing with the other fellow directly in a supervisory sense, is a frantic pursuit. He'll soon be leading you around by the

nose. The better way is to set your own high standards of performance, based upon the quotas you are required to fill plus that little extra bit that sets the expert above the crowd. Then set new goals after meeting your present ones.

He knows when a compromise is necessary for the sake of getting the job done. This requires that the supervisor have a thorough knowledge of the limits of his own authority and responsibility. He must not play fast and loose with the contract or with local agreements, but he can make concessions within his own area of responsibility to improve working conditions, to help good workmen out of unpleasant situations or to change his mind in the light of better facts than his own. This is the art of stroking the hackles of the chairman of the mine committee and coming off even with him after the compromise has been made.

If this preaching can be wrapped up in a sentence, it is this: Cooperate with fellow workers, compete with your own best standards, compromise your differences with those who disagree with you because neither you nor they are about to surrender abjectly.

That sounds like a sweet pill to cure all supervisory ills. However, we must be practical, and, human nature being what it is, you must keep in mind that you can't please everybody—but you must try. And in striving to relate in proper manner to the other people involved in the job, remember the Three C's.

Support the Roof-Fall Accident Prevention Campaign

Full success in the cooperative national campaign aimed at making a 50% reduction in total roof-fall injuries depends to a great extent upon the efforts of mine and section supervisors. The first month of the campaign is over, and we hope you can report that it was month free of roof-fall injuries in your mine. If that is not the case, begin now a special effort to stress roof safety.

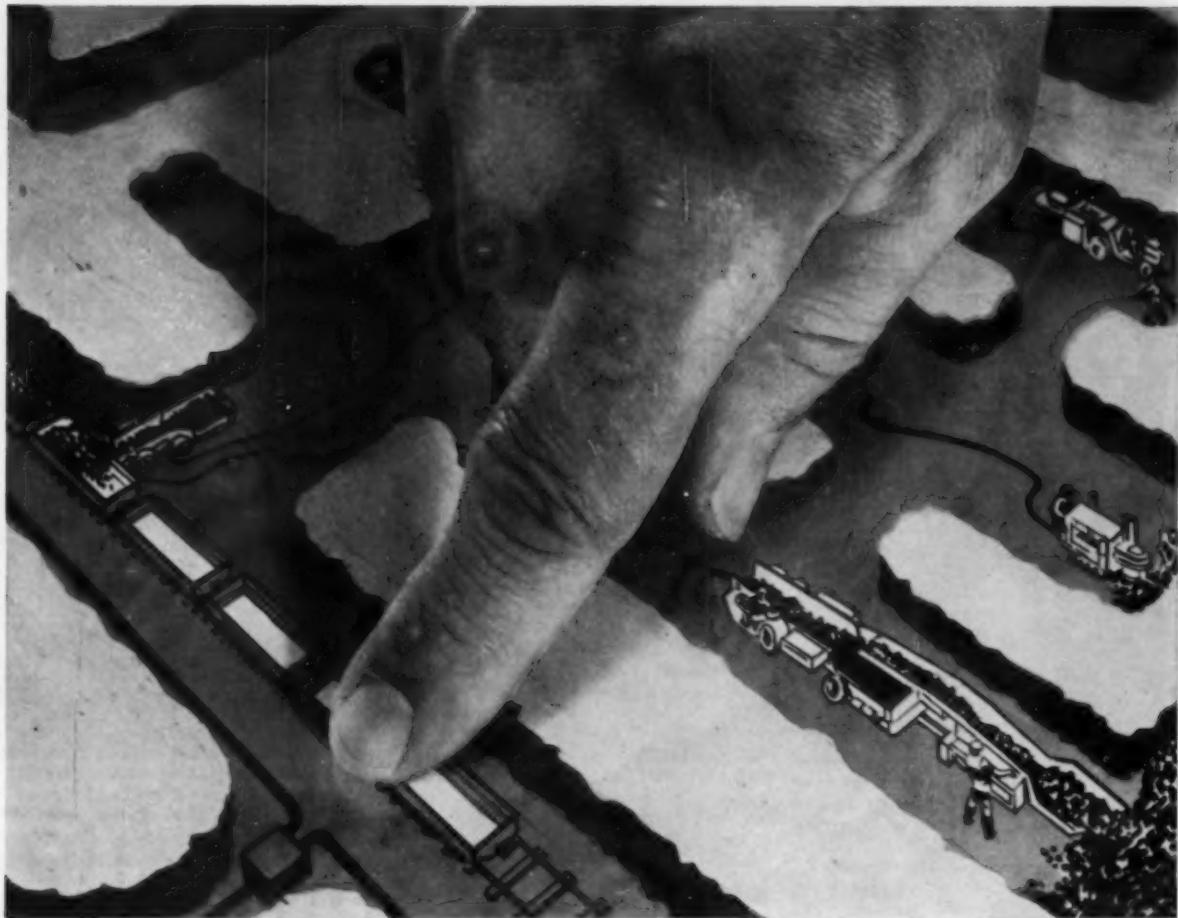
Here are some of the steps you can take:

- Demand strict compliance

with your roof-support standards.

- Be sure safety jacks are set according to the standards.
- Emphasize the need for removing overhanging ribs and brows.
- Inform your men of the aims of the national campaign.
- Leave a roof-safety message in every working place you visit.

The campaign is not a contest. You are competing only against the past record at your own mine.



Here's one way to reduce your mine power feeder costs

Many systems permit use of Rome's less expensive MPT cable

When you have a power supply system that's designed for relatively steady loads and protected against excessive overloading, you can save money on your mine feeder installations by purchasing Rome's MPT—a cable that's custom-made for this type of installation.

Rome's MPT is a special kind of thermoplastic cable that's designed to give you real economy, including low initial cost. Compared to rubber and neoprene cables, it's smaller in diameter and weighs less—these features lead to easier handling and less expensive fittings. And this tough cable lasts longer because the Rolene (polyethylene) insulation and special Ro-

seal (flame-retardant polyethylene) jacket combine to give you outstanding resistance to chemicals, moisture, and abrasion.

You can make this economical choice with full confidence. Rome's MPT is designed and built for safe operation. Individual copper shielding of power conductors furnishes ground fault protection. And bare ground wires—in direct contact with the shielding—provide a low-resistance circuit in

the event of ground faulting of equipment.

Rome MPT can be used in boreholes, shafts, trays, aerially, or underground. Sizes range from 6 AWG to 250,000 CM. A three-conductor cable, it's rated up to 5,000 volts.

Specify Rome MPT for your next job. For further information, contact your nearest Rome Cable representative—or write to Department 752, Rome Cable Corporation, Rome, N. Y.

ROME CABLE
CORPORATION

Making Ulcer-Free Decisions

By ERNEST W. FAIR
Boulder, Colo.

"YOUR JOB TOUGH? You should have mine!"

Such comment from the man who works with his muscles to the company supervisor is certain to be made just about once every minute somewhere in this land. It's the world's number one misconception as every coal-mining boss well knows.

The job which is primarily one of day-in and day-out decision making has no equal. Swinging a hammer or wrench is easy in comparison. Few men who work with their muscles are ever troubled by sleepless nights, jagged nerves or ulcers—all identifying badges of the man who works in an executive job.

Yet decision making need not be a task of mental turmoil and nervous jitters. It can never be an easy, routine job no matter how we perfect our techniques for it is basically a task of handling an entirely different and unique problem every time. But it is very definitely possible to be free of executive ulcers by learning how to simplify our decision making chores.

We've asked a number of supervisors how they achieve this very desirable end. From their suggestions here are a number of procedures anyone can use to set-up decision-making as simpler, surer and less exacting.

Learn to compromise on decisions—Select the best features of each alternative involved. When we seek to drive ahead on a fixed course doubts and difficulties always confront us. We can never be sure we have made the right choice. We can always be certain we have made a better choice when we select the good features from each alternative and blend them into the final decision.

It's the uncertainties which plague us when both sides of the problem present valuable assets and we have difficulty choosing for that reason. Even after the decision has been made doubt will come back if we leave out assets of the rejected course and these latter doubts not only bring on those ulcers but make it more and more difficult to formulate subsequent decisions in our work.

Don't put it off—This always leads to trouble, makes the final decision more difficult to reach and sometimes leads to physical troubles. Whenever a coal company executive procrastinates he courts disaster. We cannot, of course, rule out delay all together for failure to employ a little procrastination brings about snap decisions. It pays to delay just enough to be sure, and no more.

Take the time to gather the facts—

This reduces not only the possibility of error but the anxiety of never being certain we have made the right decision afterwards. Facts are any supervisor's most powerful assist in making decisions but he must learn to be sure of his facts. That takes a little time, careful checking and analysis. No details involved in the individual problem to be solved should ever be taken for granted or should we ever assume that they exist. This leads to those "after-decision" problems which are the ulcer creators.

Consult and check—It's a sure way to easier decision making. None of us possess the mental facilities to make a perfect decision every time; we need advice and assistance from others. The more we use the thinking power of other individuals in the organization the greater becomes the value of our own executive ability.

When you've made the decision final—forget it. Mulling over the question as to whether or not we chose the right course every time we make a decision does nothing toward keeping our ulcers quiet. We may be able to retrace steps in a few isolated instances but these are the exceptions and invariably our decision, good or bad, must stand.

Keep a relaxed frame of mind—It's time-proven and tested that decisions made from a relaxed frame of mind are apt to be the sound ones we constantly seek. Most bosses find that it pays to defer any decision making until such times as they have this relaxed frame of mind, that the decisions made at other times have invariably been the ones which brought them the greatest headaches. Sometimes this requires a delay of but a few moments, even an hour, and should not, of course, be confused with procrastination.

Electronic Definitions

Servomechanism—A system, usually of great complexity, in which the output of a device is sampled and fed back into the input in order to produce uncontrollable oscillations.

Rate Generator—A small but costly electrical device affixed to the output end of a servo system for ornamental purposes.

Specification—A form of heroic or epic poetry favored by engineers; a collection of impossible conditions; a collection of loopholes held together by wistful verbiage.

Wiring Diagram—A form of the graphic arts which has the characteristic of changing form constantly in the manner of cloud formations.

—Berkeley Eng. Technical Data

Cultivate decisiveness—Without it we are lost in making any decision. This is the feeling we have that surrounds the process of making a decision on any matter, large or small, connected with our job. When the ability to be decisive is lacking tension mounts within us and our problem becomes much more difficult. Even the best of us have those moments during any given business day. They are times in which we have no call for making decisions.

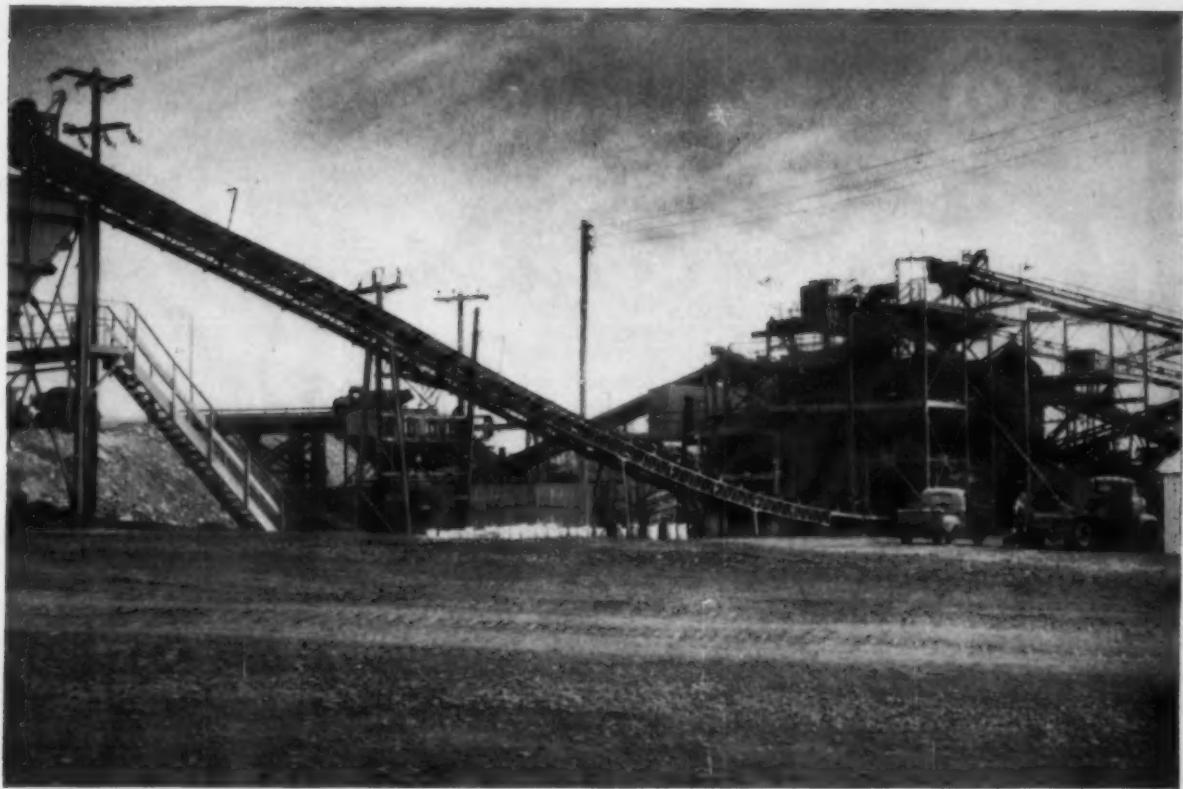
Know the decision making processes—Study them and keep studying them for one can never learn all there is to know about being a good supervisor. We can always hold down the strain of this ever-present task by having a better understanding of what a decision is and by learning how to failure-proof our decisions. Following a program of constantly seeking better ways of handling those two important factors has been found to be a sure method of holding down strain in decision making by most top-flight men.

Eliminate the fear of failure—It's a number one cause of physical and mental strain and leads to nothing but disaster in the long run. No good decision can ever be made when this cloud hangs over. It is, of course, a mental attitude and has to be handled properly just as any other problem is handled. We can be certain not only that good business decisions are never made under fear of failure but that it is perhaps a sure path to physical breakdown when we fail to conquer it at the very start. Don't fear failure.

Purpose and fairness must be present—They are always necessary to ulcer-free decision making. These, coupled with evaluation of data properly, are absolute musts to obtain good balance in handling any business problem. When all are used decision making becomes a smoother and surer process.

See both sides of the question before you make the decision—This makes certain the stands we have taken do not come back to haunt us in the future. The executive who carries a number of such haunts on his back each time a new decision is to be made is a sure candidate for long confinement in a rest home somewhere.

Keep snap decision making out of your routine—The cases where the supervisor is forced to make a snap decision are few and far between. Almost invariably those are the ones which bring him great grief in the long run. Successful men have told us time and time again that it is wise procedure to keep such snap decision making to an absolute minimum.



132 PIECES TO LUBRICATE . . .

11 Cities Service Lubricants do job!

Located at the eastern end of the great Mesabi Range, the beneficiation plant of the W. S. Moore Company is made up of 132 individual pieces of equipment.

In itself, that makes a formidable lubrication job . . . but added to that is the fact that much of this equipment must constantly be exposed to the weather.

Corrosion, oxidation and rust could reap costly damage . . . but instead they're licked!

How? Through the use of a detailed lubrication survey and frequency application chart prepared with the assistance and cooperation of Cities Service Lubrication Engineer James Levine!

Result: all 132 pieces of Moore's equipment are lubricated by eleven Cities Service Lubricants . . . and there's never been a lubrication failure!

Perhaps a Cities Service Lubrication Engineer can help simplify and improve your lubrication picture, too. It costs nothing but a telephone call to your nearest Cities Service office to bring him over. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

WHAT THE CITIES SERVICE LUBRICATION ENGINEER RECOMMENDED

EQUIPMENT	LUBRICANT
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Screen and feeders' gear boxes	Trojan L-2 and L-4 compounds
Electric motors, conveyor bearings	Trojan H-1 and H-2 grease
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Jaw and gyratory crushers	Trojan MP 90 and 140 gear oil
Open gears	Cisco 32
Jaw crusher	Trojan F-3-0

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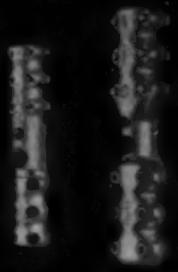
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A Storehouse of Ideas—O-B Mining and Industrial Catalog No. 27 is loaded with suggestions for more efficient haulage. Check the box to get your copy.

A Library of Information—O-B Haulage Ways brings 8,000 mining men "how-to-do-it" articles and new product information every month. Just check the box to add your name to the list.

Aluminum Feeder Cable—Supplement No. 1 to the O-B No. 27 Catalog lists O-B fittings for aluminum cable and describes correct installation procedures. Check box for your copy.



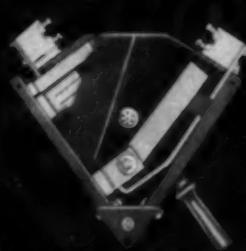
1. Cable Connectors



5. Rail Drills for Wedge Bonding



10. Porcelain Insulators



15. Feeder Safety Switches
(Cover Removed)



19. Rail Clamps



2. Trolley Frogs, Crossovers



3. Expansion Bolts



4. Automatic Couplers



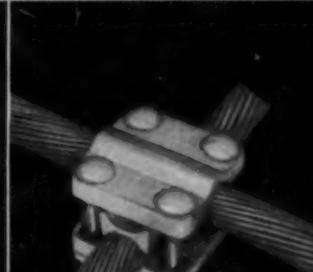
6. Trolley Wire Clamps



7. Hanger Adapters



8. Insulated Hangers



9. Branch Connectors



11. Trolley Wire Conditioning Equipment



12. Wheel Collectors



13. Feeder and Trolley Splicers



14. Quick Break Switches



16. Shoe Collectors



17. Fused Taps



18. Rail Bonds



20. Section Insulator Switches



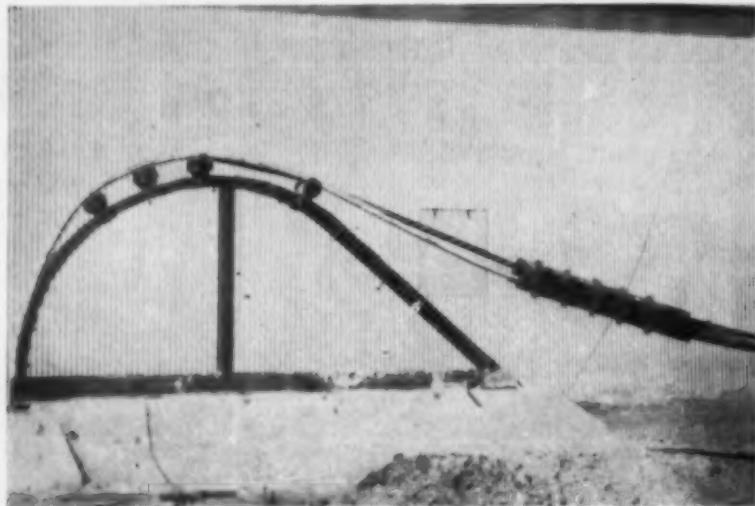
21. Combination Feeder Trolley Clamps



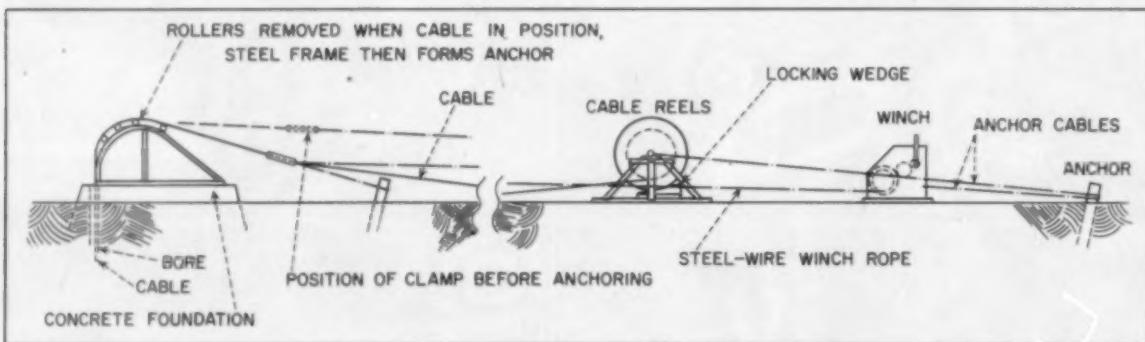
22. Bond Welding Equipment

COAL AGE

OPERATING IDEAS



LOWERING AND ANCHORING device, developed by Australian engineers, eliminates need for headframes for installing cables in boreholes. Steel rollers at top of frame reduce friction during lowering.



Lowering and Anchoring Borehole Cables Simplified

A CLEVER METHOD, developed by Australian engineers, for lowering and anchoring cables in a borehole makes it unnecessary to build heavy headframes. And the same framework can be used as a permanent anchor.

The device was developed at the Abermain Colliery, owned and operated by J. & A. Brown & Abermain Seaham Collieries Ltd., New South Wales, Australia.

Two cables were installed at the mine. One transmits 3,300-v power and the other is a 660-v signaling and telephone circuit. Both cables are designed to support their own weight when suspended in a borehole 500 ft deep.

The lowering and anchoring framework was made from standard 9x3-in

channel bent to a radius greater than the maximum allowable angle of deflection of the cable. It also provides for tangential takeoff of the cable into the borehole and to the surface trench. The framework is firmly anchored to a concrete foundation.

To reduce friction during lowering, a series of 9x4-in steel rollers were attached to the top portion of the frame. When the job was completed, these rollers were removed and the cables were bedded into grooved blocks fitted into the channel section. The clamping of similar blocks on top of the cables completed the permanent anchor.

Anchor blocks were made from 9x8 in seasoned hardwood, bored longitudinally to a slightly smaller diameter than

the cable and cut diagonally across the holes. Installation of the blocks in 9-in lengths formed segments suitable to accommodate the curvature of the framework. To safeguard against warping or cracking of the anchor blocks, 9x $\frac{1}{2}$ -in steel plate was fitted over the blocks before clamping.

During installation the cable reels were mounted on a common shaft and were supported on an anchored timber framework. A simple wedge provided adequate braking on the rim of each cable reel, but as an added precaution a 5-ton winch was anchored behind the reels and a flexible steel rope was attached by clamps to the cables. The cable was lowered in 100-ft runs and two clamps were used alternately.

THE SPLICE OF LIFE

When you splice and reinsulate with Uskorona® and re-jacket with "D.R." splicing compound, you renew the life of the cable. *The entire splice will last as long as the cable.*

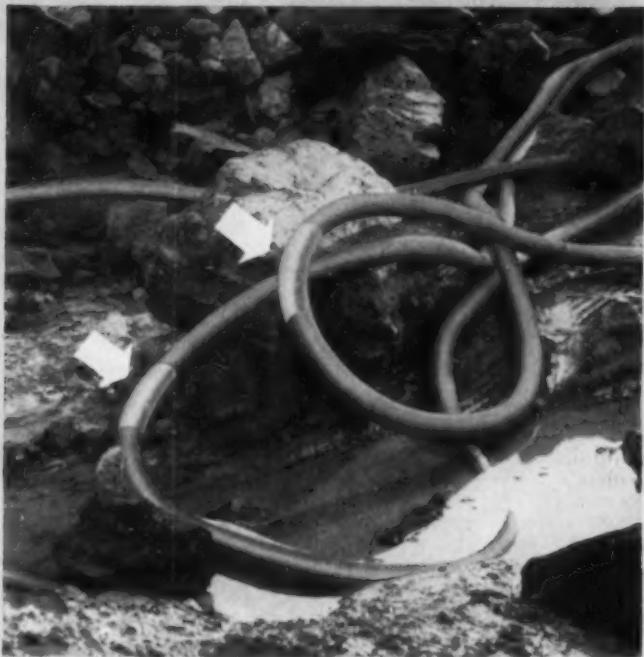
These entirely reliable tapes are:

- Extra-tight gripping, plus high in tensile strength.
- Resistant to acid, alkalies and moisture...ideal for use on mining machine cables.
- Impossible to pinhole, so dangerous leaks can't occur.
- Absolutely waterproof.

Uskorona exceeds A.S.T.M. specifications and can handle a wide range of electrical and general purpose jobs in mines. A complete line of mine tapes is available at any of the 28 "U.S." District Sales Offices, at selected distributors, or write us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.



USKORONA SPLICING TAPE



ABOVE GROUND. When spliced with Uskorona and "D.R." tapes, cables become perfect again. These splices restore the mechanical and dielectric quality of the cable, resist severe abrasion and exposure to moisture.

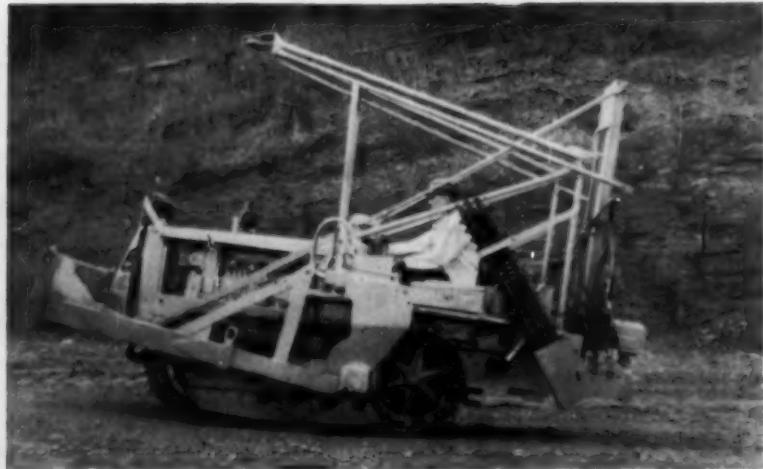


BELLO GROUND. Being run over by cable cars in coal mine can't hurt Uskorona splices protected by "D.R." splicing compound. They take this punishment many times a day.



Mechanical Goods Division

United States Rubber



Prospect Drill Cuts Own Road

EXPLORATION WORK in rugged terrain where a truck-mounted drill couldn't go is speeded with this rotary drill mounted on a tractor with a bulldozer blade. In use at the coal properties of the Alabama Power Co., the versatile unit was assembled at Alabama Power's Gorgas repair shop. The unit cuts its own roads, clears and levels drill sites, and then drills prospect holes that provide data for mining operations.

Thus far drilling has been along the outcrop in wooded, hillside terrain. But the company expects to drill hard rock in the future. Two men in one shift auger six to eight holes, each 20 to 25 ft deep and 700 ft apart. Moving, clear-

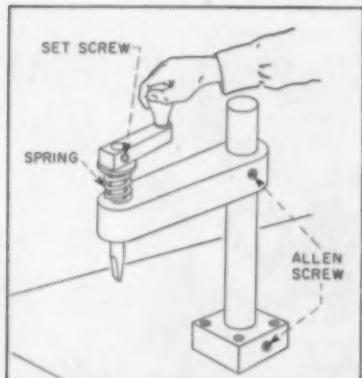
ing roadway and leveling the drill site takes at least half of each shift.

The drill itself was purchased from Mobile Drilling, Inc. and mounted on the rear of a Caterpillar D2 bulldozer. Rear mounting leaves the blade free for road clearing and leveling of the site.

A rotary unit with hydraulic controls and motor, the drill receives its power through a silent chain drive from the power takeoff of the bulldozer. The head of the drill is interchangeable, making possible use of either auger- or roller-type bits. Auger-type bits are used for outcrop drilling where no hard sandstone is encountered. For more difficult drilling in sandstone, the auger

bit adapter is removed from the drill head and replaced with a chuck to take "A" drill rods. A 4½-in roller bit is used with the "A" rods and cuttings are washed out of the hole with water from a portable tank. A Robbins Meyers "Mayno" pump with a 3-hp aircooled engine, mounted on skids, transfers the water from the tank into the "A" rods through an ox water swivel.

The company expects to put down some deeper holes and encounter some hard sandstone. For drilling this variable material, the auger will be used to sink 4½-in holes to the sandstone. Then a 4½-in roller bit will be used to continue through the hard material.



Bench Screw Driver Speeds Repairs

SPEEDY dismantling or assembly of parts is possible with this heavy-duty bench screw driver, says C. H. Willey, of Penacook, N. H. The device can be made from old parts.

Different sizes and types of bits can be adapted for use with the device. An attachment also can be made to permit use of various sizes of socket-type wrenches. The speedy action of the unit saves time and effort.

Tips on Press Fitting Wheels

THE TECHNIQUES employed in developing press fits often are handed down from shop foreman to assistant shop foreman who one day runs the shop. And the cycle is repeated many times. It is not surprising then that many of the jobs do not turn out too well under the rugged mine service, writes Paul C. Ziemke, Clinton, Tenn.

Two general methods of specifying the fit are: (1) by the maximum pressure needed to force parts together; and (2) by the difference in diameter between mating parts.

Most wheel and axle manufacturers give maximum pressures as 6 to 10 tons per inch of diameter for cast iron wheels and 10 to 18 tons for steel wheels. The standard lubricant for press fits is 12 lb of white lead to a gallon of linseed oil well mixed, preferably with a power mixer. White lead smeared on directly from the container can split a wheel or wreck the press.

An objection to the maximum pressure method is the practice of changing the lubricant if the mounting pressure is too low. The objections to the measurement method are the possibility of errors in measurement, the axle or bore of the wheel not being round, or both being taper, and the condition of the mating

surfaces. Other factors that have to be considered are the number of times the parts have been press fitted previously, the nature of the materials and the heat treatment, the speed of the press fitting and the time elapsed after the fitting is made.

Some of the larger shops force a hardened steel hub of the proper size through the wheel bore for smoothing the finish and sizing the hole. The axle is finish ground to micrometer measurements and the resulting fit is successful.

Some advantage is gained by turning the axles slightly tapered on the fit. The variation in taper is from 0.003 to 0.005 in in the length of the fit. Another technique used is that of turning the axles straight and making the final ½ in of the fit 0.0005 in larger than the initial section.

When beginning a press fit, plan to complete the work without interruption. It is imperative that the movement be continued because prolonged delays result in seizures and restarting is difficult. On equipment not designed with shoulders, presses left unattended under full pressure have been known to overshoot the intended measurement by as much as ¼ in.



At Big Horn Mine

A No. 12 helps haul roads recover fast from heavy spring rains

Haul roads at Big Horn Coal Company's mine near Sheridan, Wyo., are firm and passable despite heavy spring rains. A Caterpillar No. 12 Motor Grader teams up with a D8 Tractor-Scraper combination to keep them that way. The big No. 12 works shale—hauled by the tractor—into soft spots which could easily disrupt the 370,000-ton-per-year production at the mine.

But Big Horn, a subsidiary of Peter Kiewit Sons' Company, has year-around jobs for this versatile CAT* machine. It not only maintains haul roads, but it builds new ones. It cleans the surface of the coal seams. And it continually grades loose coal into windrows to be picked up by the tractor-scraper.

The production of this big motor grader is as important as its all-around usefulness. Today the No. 12 packs more power than ever—115 HP—and has faster reverse speeds. An exclusive Caterpillar oil clutch gives you

more efficiency and economy. Maintenance is reduced and no external lubrication is required. In addition, tubeless tires are standard equipment *at no extra cost*.

Each of these design advances assures you of still greater productivity, lower costs and longer work life. For complete information on all three sizes of Cat Motor Graders, see your Caterpillar Dealer—your source of efficient service and parts you can trust. Ask him to show you the facts and figures proving how these motor graders can step up your production and cut your costs. Better still—name the date! He'll be glad to demonstrate any of these machines on *your* job...at *your* convenience.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

WANTED—
THE HARD WORK

NOW... faster, easier going in any height seam...

COLMOL®

Continuous Mining Machines

JEFFREY NOW OFFERS a full range of heights in time-saving, cost-saving continuous mining machines. You can have all the advantages of continuous mining in seams as low as 28" with the new 86A Colmol . . . make cuts up to 96" high with the 76CM Colmol. And there is a complete range of in-between sizes.

The new 86A Colmol makes a cut 28" high and 14'7" wide, gives good cleanup and smooth bottoming. A newly designed gathering chain cuts the bottom 8" of coal and leaves no valleys. Coal is carried to the center of the Colmol, then up the center onto the swinging discharge conveyor.

With a Colmol, coal is broken from the face, not

ripped or ground off. You get more favorable overall screen consist, as well as extra speed and efficiency.

The Colmol is a powerful, rugged, compact machine. It is capable of withstanding the most severe operating conditions...operates with little noise and practically no vibration. All adjustments are hydraulic and can be made instantly and accurately. Once the controls have been set, they need almost no attention. Operator fatigue is greatly reduced with the smooth-going Colmol.

Readily accessible operating parts make adjustments and servicing easy . . . keep downtime to a minimum. And the Colmol is equipped with safety features to protect both personnel and the machine.



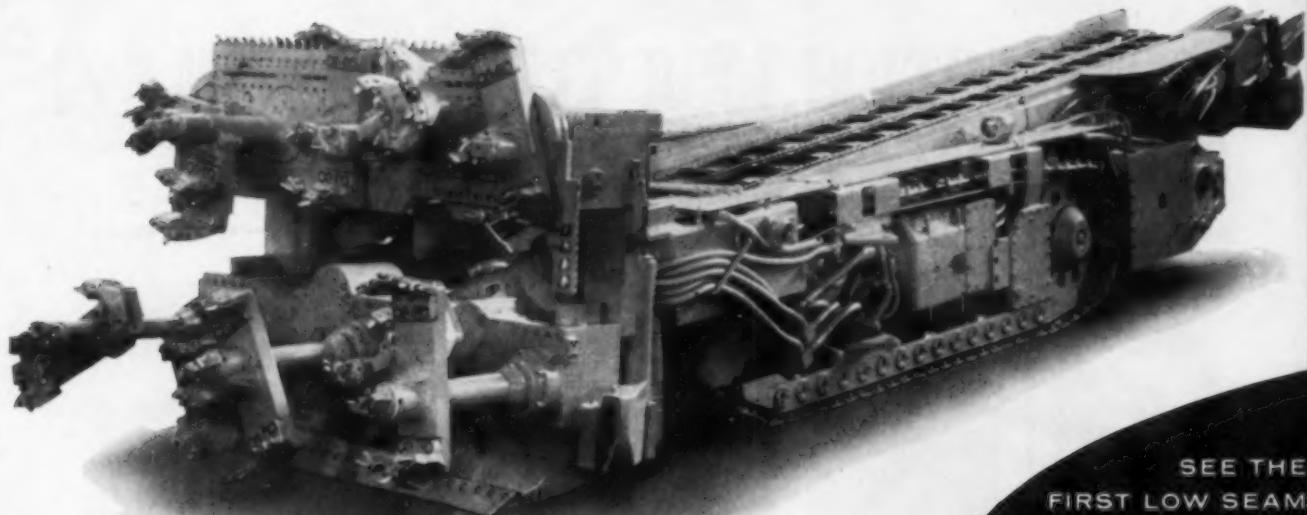
Molveyor trails the Colmol, sends output back in an uninterrupted stream. Trams under full load, forms flexible link between Colmol and belt line.



Loaders have power for the toughest jobs. Discharge conveyor swings 45° to either side of center and elevates to proper height for most efficient loading. Easy to maneuver.



Belt Conveyors for all purposes are available in the complete Jeffrey line. You can choose the exact head section and frame for every coal moving task.



UP TO 96" HIGH

SEE THE
FIRST LOW SEAM
CONTINUOUS
MINING MACHINE

NEW
86A COLMOL



ONLY 25" HIGH-14'7" WIDE



Jeffrey Shuttle Cars haul big payloads. They're built for rugged service and easy maneuvering. Variable speed loading and unloading make them highly efficient.

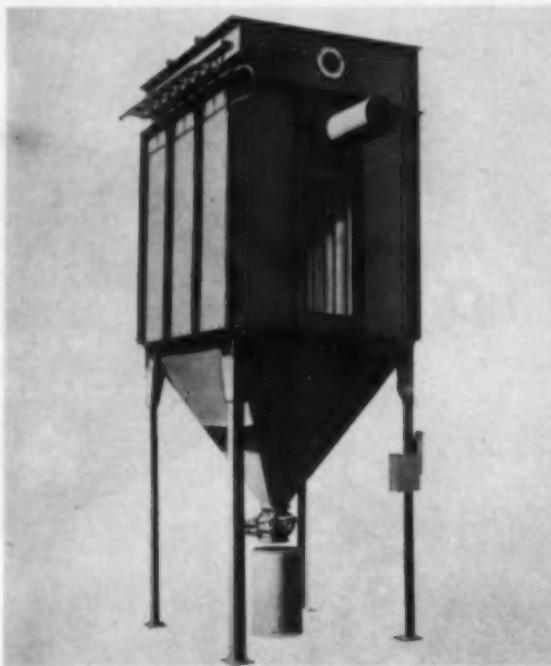
THE JEFFREY MANUFACTURING COMPANY • COLUMBUS 16, OHIO



JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT...TRANSMISSION
MACHINERY...CONTRACT MANUFACTURING

EQUIPMENT NEWS

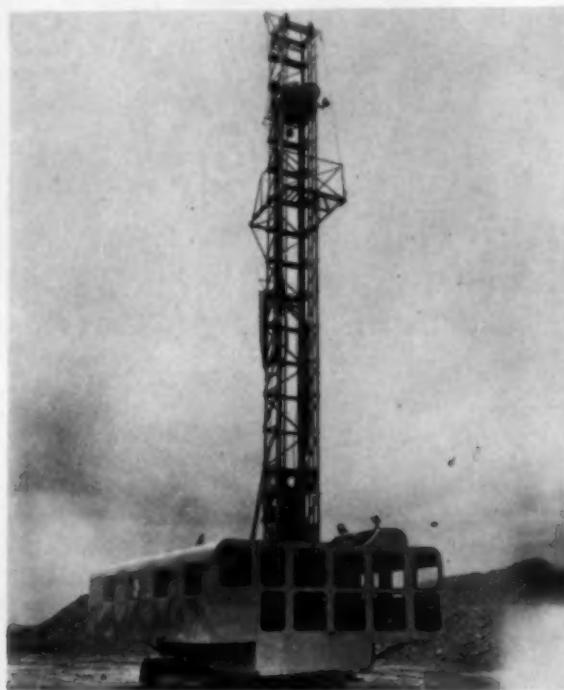


Dust Collector Has No Moving Parts

The Pulverizing Machinery Div., Metals Disintegrating Co., has introduced a dust collector designed with no internally moving parts. The collector is the "Mikro-Pulsaire," which is said to employ a radically new method of continuous filter cleaning, a method which includes the design of no moving parts. The collector consists of varied numbers of cylindrical filter elements 4 ft or 6 ft long enclosed in a dust-tight housing. Dust-laden air is admitted into the housing through a side port. Clean air is withdrawn from within by an air circulating system. A major portion of the dust material moves directly from the port down to a discharge vent at the bottom of the housing. The balance of the dust material is retained on the outside surfaces of the filter elements, which, as the dust accumulates, are periodically cleaned by a jet of high pressure air introduced through a specially contoured venturi mounted above each filter cylinder. One filter element tube at a time is cleared to permit a continuous flow of dust through the collector. No lubrication is required for the Pulsaire, according to the manufacturer, who recommends its use for a wide range of materials including abrasives. Pulverizing Machinery Div. will make the Pulsaire in units with 9, 20, 30, and 48 filter tubes either 4 ft or 6 ft in length. Capacities range between 400 and 600 cfm in the smaller units to between 3,350 and 5,000 cfm in the new Model 48 (photo).

Reich Drill Has Enclosed Rig Body

Reich Bros. Mfg. Co. has designed and fabricated a rotary drill with an enclosed, air-conditioned rig body. Designated Model C-675 the drill has been manufactured to take part in a current expansion of the British coal industry. Reich Bros. points out that the drill's enclosed body has a dual



purpose—operator comfort and all-weather maintenance. In the United Kingdom the Model C-675 will be used for core drilling to depths of 1,500 ft. It has a 50-ft stroke. The company's address is 1439 Ash St., Terre Haute, Ind.



Army Testing Robot Tractor Control

The U. S. Army Research and Development Laboratories at Fort Belvoir, Va., are testing a robot tractor that can be operated anywhere within the range of a controlling radio. The Dept. of Defense believes remotely controlled construction equipment may prove invaluable when used in radioactivated areas and combat zones. But civilian applications are believed possible, too, e.g. fire fighting. The tractor at Fort Belvoir, a Le Tourneau Westinghouse "Tornadozer," is being controlled from a jeep and helicopter equipped with a standard military radio transmitter and a special control

IN 3 MINUTES THE CP ROOF BOLTING UNIT...



These EXTRAS are available:

- Special low-speed spindle attachment for slow-speed drilling
- Low-seam drilling attachment for low-coal

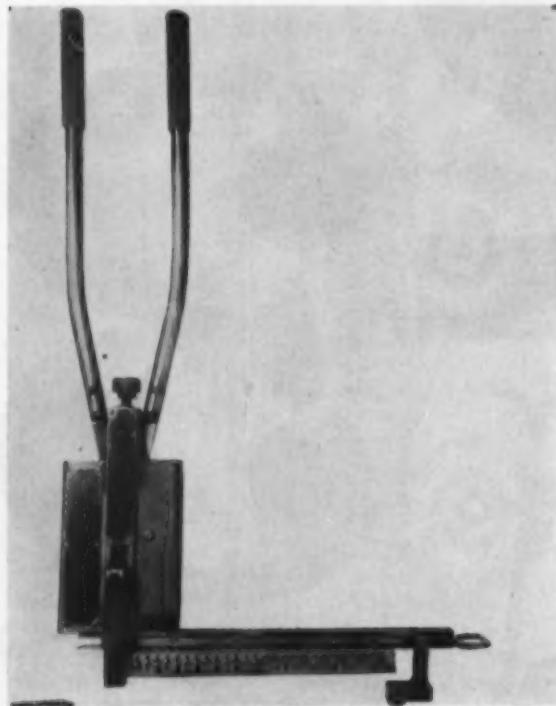
Only 28 inches high, the self-propelled RBD-30-S is ideal for use in low coal, takes high seams in its stride — even drills slate, shale and laminated limestone without delays. A power take-off from auger and bolt-setter motor powers a totally enclosed drive gear. Tramming control is within easy reach between guide arm handles. Telescopic chuck has a 6-inch auger adjustment to conform to roof irregularities. Built-in slip clutches prevent stalling . . . wheel locks prevent unit from shifting position.


Chicago Pneumatic

8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

box. An operator can start and stop the machine, engage and disengage the gears, operate in forward and reverse, manipulate the dozer blade up and down, and activate the steering mechanism. Normal operations, according to the Dept. of Defense, can be performed from distances of 15 mi, the range of the radio. Army engineers, seeking to go one step further, believe that the installation of small television cameras on the tractor will give a remote operator additional operational capabilities and eliminate a visual observer. Current tests are being conducted with the tractor and control point within viewing distance.



Lightweight Belt Splicer

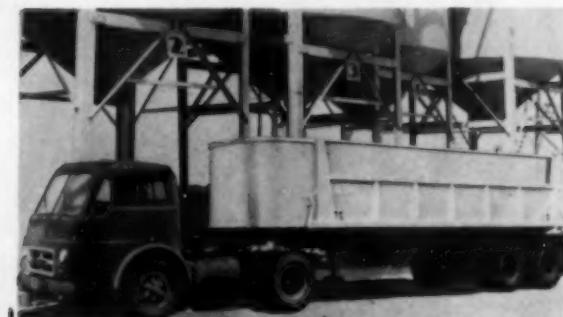
A lightweight (17½ lb) belt splicing machine, the Hayden Autoclip, has been introduced by the National Mine Service Co., Alcon Bldg., Pittsburgh 19, Pa. National Mine recommends the machine for use in low coal, since the Autoclip is only 3⅓ in long. The company adds that the flexible splices made by the machine are comparable in strength with all other Hayden splices. To use the Autoclip an operator detaches a magazine and loads it with a comb of splicing hooks. Clamping jaws are then adjusted to the thickness of a belt, the magazine is replaced, and the machine is clamped to the belt. With each closure of the handles, which operate on a horizontal plane, a single hook is inserted.

Compact, Self-Propelled Air Drill

A rotary air drill mounted on a self-propelled air compressor has been developed by Schramm, Inc., for use in blast hole drilling and for surface operations in underground mining. Schramm has named the drill the Pneumatractor Rotadrill and says initial cost is low because the Pneumatractor on which the Rotadrill is mounted is both a 125-cfm compressor and a wheel tractor, yet costs no more than a conventional compressor. Schramm also points out that the compactness of the Rotadrill permits it to be moved from hole to hole more rapidly than a conventional three-piece unit consisting of a separate wagon drill, a portable compressor, and a tractor. Features: holes up to 500 ft with 2½-in flush drill pipe; a compressed air supply of 150 cfm at a drilling pres-

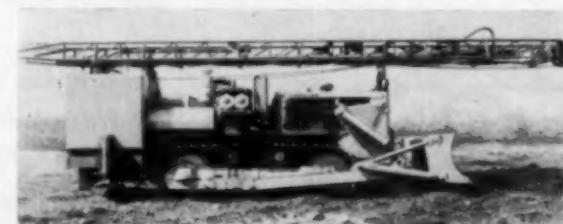


sure of 10 psi; breakout air pressure to 125 psi; speed rotation 75 rpm. Schramm's address is 900 East Virginia Ave., West Chester, Pa.



Trailer Payload Is 10 to 40 Yd

Galion Allsteel Body Co., Galion, Ohio, is manufacturing a tandem axle trailer dump designed for hauling in areas where highway weight limit laws set a medium gross weight limit and permit credit for only one set of tandem axles. The trailer is the Model STMF Transporter. It is intended for use with single rear axle tractors and is fitted with a front-mounted Uni-scoopic single cylinder hoist which shifts hoist weight forward and on to the tractor. The company says the weight shift permits additional loading of the trailer axles and increased payloads. Payload capacities range from 10 to 40 cu. yd.



Rig Drills 10-In Blast Holes

A tractor-mounted rotary air drill dubbed the Model M-8TA is being manufactured by the Davey Compressor Co., Kent,



WIRE ROPE AT WORK

Here is a tireless mechanical monster that strips off incredible tonnages of dirt and rock as it digs for coal. It is the property of A. E. Dick Contracting Co., Hazleton, Pennsylvania. When photographed, the powerful dragline excavator was nearing a rich seam of anthracite that lay beneath the overburden.

Stripping has its own special torture-test for the wire ropes in draglines and hoist lines. But the ones on this machine can take it. They're Bethlehem Purple Strand—6 x 25 for the draglines, 6 x 41 for the hoist. The two draglines, with a diameter of 2½ in., were chosen for their combination of strength and abrasion-resistance. The 2-in. hoist cables have to be tough, strong, and highly flexible. Working as teammates, these Bethlehem ropes are part of the "muscle" that enables the excavator to master any stripping job.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • QUARRYING • CONSTRUCTION • EXCAVATING • PETROLEUM • LOGGING • MANUFACTURING





The original bit with the enclosed tip

Designed to take advantage of the extremely high compressive strength of Carboloy cemented carbide. Has the ability to withstand more abuse than any other design without breakage or loss of tip. Results to you:

1. Fewer bit changes
2. More coal production¹ per bit and per shift
3. Reduced downtime costs

WHY CARBOLOY[®] CCS-2 BITS MINE MORE PER SHIFT, AT LOWEST COST PER TON

The Carboloy CCS-2 Heavy-Duty Bit combines high-speed cutting efficiency with low-cost operation. From tip to shank, it's designed for longest service . . . cutting through toughest formations.

The CCS-2 is the original bit with the enclosed tip. Inserted at the best angle to withstand cutting forces, the carbide is held in place by a combination of 360° braze and mechanical holding. This design, plus the flare of steel behind the tip, gives maximum protection against "break-out" . . . means more production per tool, less downtime for bit changes.

There's longer life built into the shank, too. It's specially heat-treated steel with a hard core

to resist bending and breaking . . . with a softer "skin" for positive seating of the set screw.

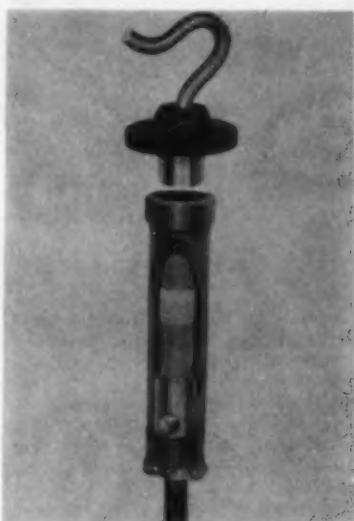
These are the reasons the Carboloy CCS-2, with its 1 1/4" stop, is the most widely accepted bit in the mining industry. It's ideal for continuous miners and conventional machines using 1/2" x 1" bits.

The CCS-2, like all bits in the complete line of Carboloy mining tools, is stocked locally for immediate delivery. For more information, or in-mine assistance, call your Authorized Carboloy Mining Tool Distributor (listed on the opposite page). Or write: Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Street, Detroit 32, Mich.

CARBOLOY[®]
CEMENTED CARBIDES
GENERAL ELECTRIC

Equipment News (Continued)

Ohio, for heavy jobs. The unit, according to Davey, will drill 10-in blast holes and has a 35,000-lb pull down pressure. The M-STA uses compressed air for cleaning drilled holes and is said by the maker to be the only rotary that is completely successful as an air core drill. Davey says too, that the unit attains higher rotating speeds than other drills (85-155-325 rpm normal drill bit speeds with a three-speed transmission). Originally designed for mounting on a Caterpillar D8, the drill can be adapted to other tractors. Two hydraulic cylinders raise and lower its mast. And, weight, including a tractor, is approximately 29 tons.

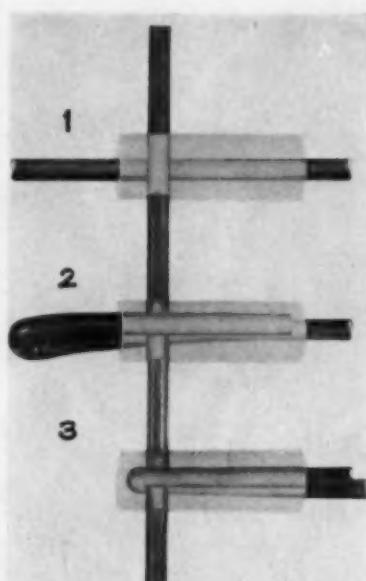


Fibre Glass Trolley Tap

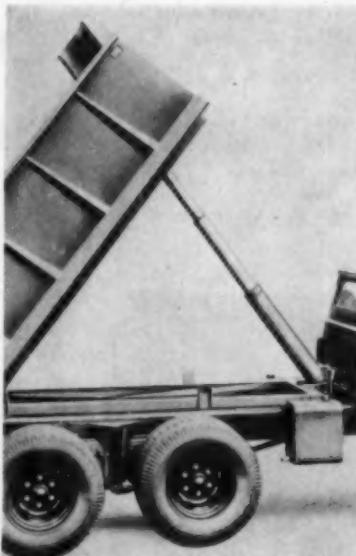
A new fused trolley tap that provides a positive electrical connection, stops cable and insert pull outs, and is fire-resistant has been announced by Standard Devices Co., 3231 Warrensville Center Rd., Cleveland 22, Ohio. The tap is made with a fibre glass impregnated case, which is designed with molded threads at its top to hold the tap's hook insert securely. The base of the case is equipped with a clamp that acts as a strain relief, taking pressure off the bottom of the fuse holder and preventing cable pull outs, loose connections, and overheating in the tap. A screwdriver is the only tool needed to assemble the tap, which takes all regular trolley tap fuses and fits all popular cable sizes.

Plastic Fuse Connector

A plastic connector that reportedly provides a simple but effective method of attaching detonating fuse before blasting is being made by the Austin Powder Co., Cleveland 13, Ohio. When used for joining trunk and branch lines the connector is said to assure a positive coupling that won't slip, loosen or lose contact in any weather under any job condition. In addition, knot tying is eliminated. The



manufacturer says that fuse is fastened in the connector in any easy three-step operation. First, the fuse from the shot hole is threaded through the length of the connector (1). Then the trunk line is pressed into grooved slots (2). Finally, the branch line is passed over the trunk line, returned the length of the connector and pulled tight. Austin is distributing Bulletin LL-5588 describing the connector.



Telescopic Hoist Line New

A line of Gar Wood-St. Paul front-mounted telescopic hoists which the maker has designed to permit greater payloads under current axle weight limit laws is being produced by Gar Wood Industries, Inc., Wayne, Mich. The hoists are designed with a socket mounting arrangement at the base and top of the cylinder to eliminate side load

Carboloy Mining-Tool Distributors

Your local Carboloy Mining-Tool Distributor is listed below. His complete stocks guarantee you immediate local delivery.

ALABAMA

Birmingham 2—Shook & Fletcher Supply Co.

COLORADO

Denver 17—Mine & Smelter Supply Co.

ILLINOIS

Mt. Vernon—Central Mine Supply Co.

INDIANA

Terre Haute—The Mine Supply Co., Inc.

KENTUCKY

Harlan—Kentucky Mine Supply Co., Inc.
Madisonville—Central Mine Supply Co.
Paintsville—Farmer's Supply Co.
Pikeville—Big Sandy Electric & Supply Co., Inc.

NEW YORK

Buffalo 23—Austin Ford Logan, Inc.

OHIO

Cambridge—Cambridge Machine & Supply
Steubenville—Voto Manufacturing Sales Co., Inc.

OREGON

Portland—J. E. Haseltine & Company

PENNSYLVANIA

Johnstown—General Electric Supply Co.
Pittsburgh—General Electric Supply Co.
Washington—Fairmont Supply Co.

TENNESSEE

Knoxville—Crowell Engineering & Sales Co.
Knoxville—W. J. Savage Company

TEXAS

El Paso—El Paso Saw & Belting Co.
El Paso—Mine & Smelter Supply Co.

UTAH

Salt Lake City 1—Mine & Smelter Supply Co.

VIRGINIA

Andover—Central Supply Co. of Va., Inc.
McClure—Erwin Supply & Hardware Co.

WEST VIRGINIA

Bluefield—Bluefield Supply Co.
Bluefield—Rish Equipment Company
Charleston—Rish Equipment Company
Clarksburg—Rish Equipment Company
Fairmont—Fairmont Supply Company
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Ravenswood—Fairmount Supply Company
Shinnston—Erwin Supply Co.

CARBOLY
CEMENTED CARBIDES

Patents Pending

Double Your Coal Washing Output in Present Floor Space

Now, with the new CONCENCO® "77" DIAGONAL-DECK® Coal Washing Table, you can clean twice as much fine coal in a given floor area as was formerly possible with the best single deck tabling potential.

Not only that, but cleaning cost per ton with twin decks is substantially reduced because both decks are actuated at less than 3 H.P. from a single, integrally connected head motion . . . all in floating suspension. This, in turn, reduces impact to the building resulting in first cost savings with lighter housing structures.

For complete information, send for Bulletin 77.

For Single Deck Installations, Use the
SuperDuty® No. 7 Table

Where its use may be indicated, the SuperDuty DIAGONAL-DECK Table continues to offer highly efficient and economical preparation of fine sizes. Special models are available for high refuse feeds. For full information, simply ask for Bulletin 119.



THE DEISTER®
CONCENTRATOR
COMPANY

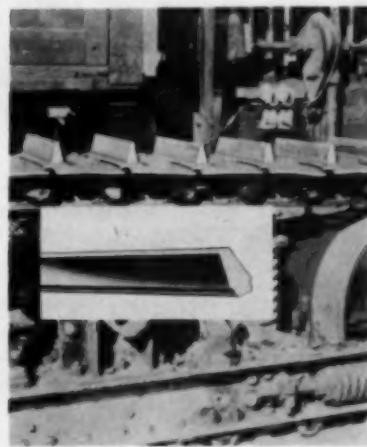
923 Glasgow Ave. • Fort Wayne, Ind., U.S.A.

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PRODUCTS

★ The ORIGINAL Deister Company • Inc. 1906

Equipment News (Continued)

stresses. In addition special "X" type bracing is said to give the sub-frame unusual strength and rigidity. Added feature: an automatic safety relief valve to eliminate extreme high pressure at the end of a cylinder stroke.



Tractor Grouser Retreads

Allied Steel & Tractor Products, Inc., is producing a line of tractor grouser retreads for rebuilding the grouser shoes of track-laying or crawler type equipment. Allied says that by using its Bulldog Tractor Grip-Lugs operators can re-lug equipment without dismantling. The company adds that its Grip-Lugs have a specially designed shape and an engineered groove and bevel that permit welding more quickly than with original parts. Supplied in 10-ft lengths, the Grip-Lug is also available cut to length and ready to weld. Allied address: 7835 Broadway, Cleveland, 5, Ohio.



Automatic Emergency Light

A self-contained "Sentry-Lite" being manufactured by the American Optical Co., Safety-Sun Glass Div., Southbridge, Mass., is designed to be fully automatic in large areas during emergencies. The



New Okoweld both insulates and sheathes
splices on cables operating up to 2000 volts.

New Splicing Tape proves ideal for portable cables on rugged jobs

Self-fusing, all-weather OKOWELD scores solid hit

At last! . . . an all-weather, self-fusing splicing tape, especially suited to rugged conditions in mines and on construction sites. Dealers report great enthusiasm for new OKOWELD, a multi-purpose tape that gives standout performance on both plastic and rubber cables.

OKOWELD's mechanical toughness makes it ideal for cables that get plenty of rough treatment. And it actually grows tougher with age!

OKOWELD fuses rapidly into a solid wall of insulation . . . cannot unwrap or separate into

layers like "adhesive" tapes.

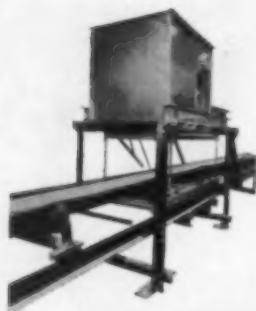
OKOWELD has good dielectric strength and high resistance to water, weather, ozone, oils, abrasion and, *important to you*, it is fire resistant . . . passes Bureau of Mines Flame Test.

OKOWELD is simplicity itself to apply—fits like a glove over irregular surfaces. Yet it's non-sticky and non-brittle—and either side is "up". *Color coded, too . . .* comes in five colors.

Here's the thousand-uses splicing tape that never sits in the electrician's tool box waiting for work. Ask your distributor for full facts today, or write to The Okonite Company, Passaic, New Jersey.

Sold only through authorized distributors

OKONITE SPlicing TAPES



how much has the conveyor carried to NOW?

The MERRICK WEIGHTOMETER gives the answer. While material is smoothly moving along a conveyor, the MERRICK WEIGHTOMETER not only keeps a continuous and accurate record of weights but total weight is available at a glance.

Applied to any size belt conveyor, either horizontal or inclined. The Weightometer gives a simplified and dependable record of your production, without interrupting flow of coal.

Write for Bulletin 851

MERRICK SCALE MFG. CO.
Engineers and Mfrs. of Automatic
Weighing Equipment
PASSAIC, N. J.

**BUILT
TO
TAKE
ABUSE!**



A truly portable bondwelder built as GUYAN builds everything — **RUGGEDLY** — to stand up under the roughest use.

Ideal for rail bonding, general intermittent welding and similar work. It will develop 80 to 200 amperes in six proportioned taps. These quick-change tapered plug-and-socket taps assure rapid, easy selection of the proper welding current.

Thin design permits easy removal from cars. *And this GUYAN Bondwelder is so easy to handle even in low coal! Haul it from job to job . . . easily and quickly . . . and put it to work immediately.*

Don't forget — whether you need a welder for rail bonding, repair jobs in the shops or special welding — there is a GUYAN Bondwelder to meet your requirements.

Write for descriptive literature.
GUYAN MACHINERY CO.
LOGAN, WEST VIRGINIA

Guyan
BOND WELDERS

Equipment News (Continued)

light is the Model 300X and its 5,000-candle power sealed-beam lamps will stay lighted for 6 hr. The 300X also contains an automatic recharger which operates on standard electric power. Among other features of the 300X are a test panel, an AC fuse, a toggle switch for cutting off light, and a pilot light to indicate the unit is functioning.



New Air Compressor Line

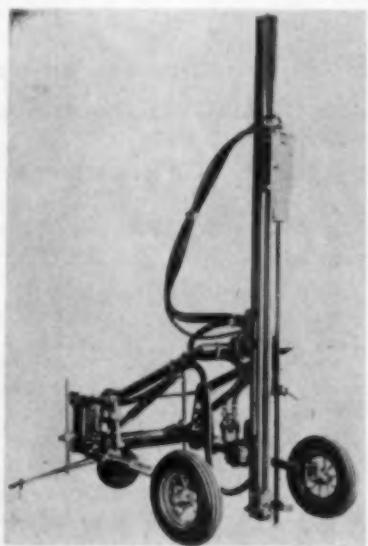
Manufacture of the lightest, shortest-turning 600-cfm rotary air compressor is the claim of Le Roi Div., Westinghouse Air Brake Co., Milwaukee, Wis. The company says its 600RD2, the first in a new line of rotary air compressors,

is a portable, two-stage, sliding vane type unit that weighs 7,730 lb and will turn in only 11 ft, 11 in. The compressor is coupled to a GM-71 diesel with a hydraulically activated clutch. By use of an automatic variable capacity regulator and an automatic governor speed control, engine speed varies to match air demands.



Adjustable Stroke Pump

Denver Equipment Co., Box 5268, Denver 17, Colo., is making a 4-in adjustable stroke diaphragm pump which is designed to deliver a longer stroke and up to 75% more capacity. An adjustment, says the company, can be made while the pump is operating. The pump's diaphragm assembly can be removed from front or rear by removing four bolts. Denver is making the unit in capacities to 70 gpm for simplex and 140 gpm for duplex.



Utilizes Longer Steels

Schramm, Inc., says it has a new and improved wagon drill in the DR-126-A,



At Steep Rock Lake, Ontario, dredge pumps lined with Lukens "T-1" steel (321 min. Brinell) remove two million cu. yds. per month.

Rock, Gravel Crash Through World's Most Powerful Dredges; Lukens "T-1" Steel Adds 33% to Liner Life!

TRADEMARK



Dewatering of this Canadian lake by Caland Ore Company, Ltd., will permit open-pit mining of hematite ore.

In dredging operations, impact and abrasion combine with brutal force to give pump liners expensive beatings. In the world's most powerful dredges, Lukens "T-1" steel now slashes this expense for Construction Aggregates Corp., agents for Caland Ore Co., Ltd.

With order after order, Lukens "T-1" steel is lasting 33% longer than the abrasion resistant steel formerly used.

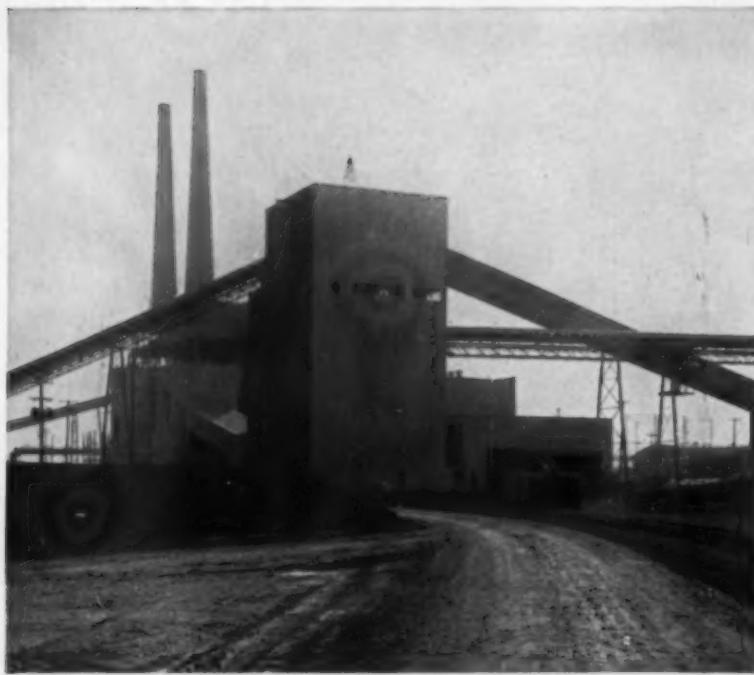
Whether you handle stone, coal, or metal ores, Lukens "T-1" steel used in the areas hardest hit by punishing abrasive impact will save you money, too. It has tripled the life of rock driers. The 321 minimum Brinell quality has been known to outlast previous metals by 18 to 1 in quarry wear plates.

Chutes, hoppers, and mine cars are other typical applications.

And Lukens "T-1" steel retains its remarkable combination of hardness and toughness at temperatures well below zero. Send for our informative, illustrated booklet, "Lukens 'T-1' Steel." Write Manager, Marketing Service, Room 961, Lukens Steel Company, Coatesville, Pennsylvania.



Helping industry choose steels that fit the job



Moves a million-ton mountain of coal a year!

One of the largest in the U. S., this system depends on over 7,000 feet of Quaker Rubber belting to keep the coal moving.

PROBLEM: The Detroit Edison Company needed three separate conveyor systems to carry coal into their River Rouge power plant: (1) dock to storage, (2) dock to breakers to plant, (3) storage to breakers to plant.

SOLUTION: Quaker engineers and the Quaker distributor's men, working with engineers of the power plant, suggested the use of a belting designed for high lifts and long center distances. Over 7,000 feet was installed.

RESULT: The three conveyor systems work smoothly and efficiently, carrying coal into the plant at the rate of one million tons a year.

YOUR PROBLEM: Whatever your conveyor needs, whatever your industry—there's a Quaker Rubber Belt (or Hose) of the right construction to handle the



To make sure 7,000 feet of Quaker Rubber conveyor belting (available in 48", 60" and 72" widths) was properly installed, splicing and vulcanizing of the belting was supervised by a Quaker Rubber specialist.

job safely and economically. Quaker engineering service is available for the asking.

For your free brochure on conveyor belting, write your nearby Quaker Rubber distributor, or:

*H. K. Porter Company, Inc.,
Quaker Rubber Works,
Philadelphia 24, Pa., or
Pioneer Works, Pittsburgh, Calif.*

QUAKER RUBBER DIVISION
H. K. PORTER COMPANY, INC.

Equipment News (Continued)

a drill that is larger, easier to use, and more powerful than previous models, according to the company. Features include a long feed travel, a new down-pressure motor and line oiler, and a full range of feed pressures. A standard 4-in drifter is employed by the DR-126-A, in addition to a 10-ft feed travel for 8-ft steel changes an improvement over the previous 8-ft travel for 6-ft steels. As a result, says Schramm, drilling time is extended and drill changing delays are cut down. Other improvements: a double-cylinder, seven-bladed air motor, which is a high torque unit delivering 14 impulses per revolution; and infinite number of supply air feed pressures; and a Schramm Centralizer, which prevents the drill from "walking" when a hole is begun.



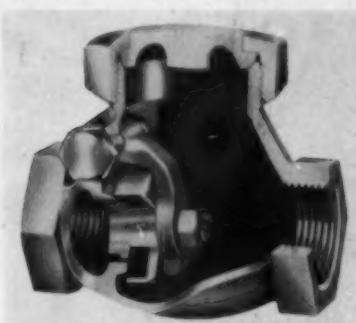
Rotary Compressors

Gardner-Denver Co., Quincy, Ill., has added two models—the RP125 and the RP365—to its line of rotary compressors. Some features: retention of a clutch, as in earlier models, between the engine and the compressor; a warm oil flow to the compressor as soon as it begins turning; constant temperature for the compressor and the engine during extreme weather. Both units also require only a few minutes to inspect working parts, according to the company. The Model RP125 (top photo) is available with either gasoline or diesel engine. The RP365 (bottom photo) is made with a diesel as standard equipment.

Renewable Disc Valve

A bronze swing check valve with a renewable composition disc has been added to the Fairbanks line of bronze and iron body valves made by the Fairbanks Co., 393 Lafayette St., New York 3, N. Y. The discs can be replaced without removing the valve body from the line. Fairbanks makes the discs in a medium-hard type for liquid service, but steam valve discs are also available. The

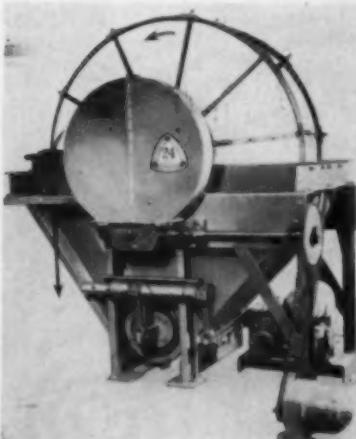
Equipment News (Continued)



valve is rated at 150 lb steam working pressure, 300 lb cold water, oil and gas pressures. It is available in sizes from $\frac{1}{2}$ in to 2 in.

Portable Electric Sets

Three new portable diesel electric sets have been announced by the Caterpillar Tractor Co. The units are the D311, D315 (Series G), and D318 (Series G). The D311 set develops 30 kw of 60-cycle, three-phase current, the D315 is rated at 40 kw, and the D318 at 60 kw. All three are available as skid-mounted units or they can be equipped with running gear. The outputs of their self-regulated generators furnish a choice of 120, 240, 120/208 and 480 v at 1,800 rpm. Standard equipment includes 24-v, 18-amp charging generators and 24-v, 170-amp-hr battery sets.



Agitator Type Disc Filter

Denver Equipment Co. is producing an "agitator type" disc filter which is said to increase filter capacity and decrease maintenance needs. The unit's agitating mechanism is designed to keep solids in pulp in suspension and to maintain a homogeneous pulp regardless of what it is. The result, according to Denver Equipment, is greater capacity and lower final moisture because of more uniform cake distribution. In designing the filter Denver eliminated the need for a packing gland, sealing water, and

**Mine Roof Bolting Problems?
Call on West Virginia!**

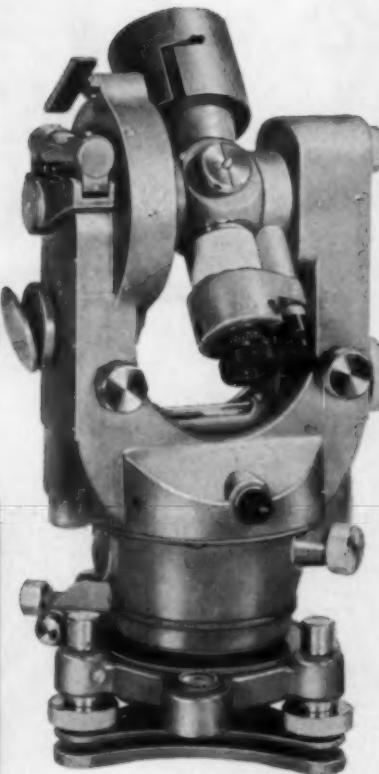
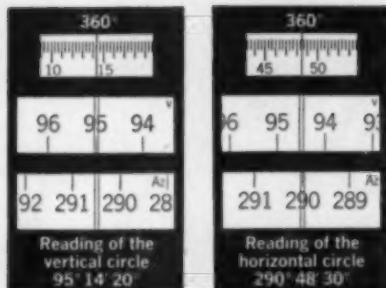


CONNORS STEEL DIVISION

H. K. PORTER COMPANY, INC.

WILD
HEERBRUGG

T-1 Optical Repeating Transit



*By day or underground, this **WILD** instrument offers unprecedented advantages*

From its optical excellence to its mechanical precision the T-1 has earned a world-wide reputation for great performance. Users everywhere praise the instrument for its rapid set-up, high accuracy and virtually unlimited versatility!

NOTABLE FEATURES OF THE WILD T-1

- Reads direct to 20 seconds with interpolation to 10 seconds, on both horizontal and vertical scales.
- More than a dozen accessories are available for quick, simple, accurate solution of routine and special problems.
- Built-in illumination for both circles, scale and reticle.
- Rugged, precision construction throughout.

PRICE: \$718; F.O.B. Port Washington, N. Y. Tripods extra. Write for Booklet T-1.

**WILD HEERBRUGG
INSTRUMENTS, Inc.**

Main at Covert Streets • Port Washington, N. Y. Port Washington 7-4843
SALES • FULL FACTORY SERVICES

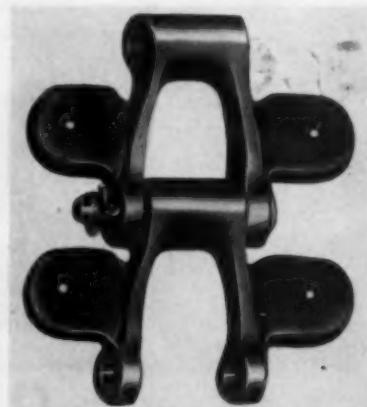
Equipment News (Continued)

tank bearings, concluding that this would make maintenance problems negligible. Denver Equipment, whose address is Box 5268, Denver 17, Colo., is making the units in 4-, 6-, and 9-ft diameters.



Base Cuts Down Time

American Pulley Co. says that lost production caused by stretched and sagging belts can be eliminated by using the company's "Adjusto-Slide" motor base. With the base, according to American Pulley, belt take-up can be accomplished by adjusting only one screw—even with the motor running. Belt replacement reportedly is just as simple, since the adjustment screw on most models can be loosened and swung aside after a motor has been stopped to permit enough motor movement for removing the old and installing a new belt.



Steel Conveyor Chain

Forged steel conveyor chain in which each link is made with a wing attachment has been introduced by Robert A. Main & Sons, Inc., 257 Pascack Rd., Paramus, N. J. The company says the chain can be furnished for acid or heat conditions. The pin of each link is locked against rotation and a simple design permits breakdown or assembly quickly. The

*Prolong machinery life
and save money—*

with FALK Steelflex Couplings

Ever since the first Falk Steelflex Coupling was designed and built, we have firmly held to these beliefs:

1. A coupling, to give fullest value, must do more than merely connect driving and driven machinery—it must protect the machinery and prolong its life.
2. A coupling, to be truly flexible, must overcome the effects of shock and vibration, as well as shaft misalignment.

Proof of the soundness of those beliefs is furnished by the record. More than one million Falk Steelflex Couplings have been used on every conceivable type of industrial application... giving trouble-free service, providing maximum protection to connected machinery.

* A single basic type—the famous Type F—fills 90% of all industrial application needs. It is versatile, efficient and economical. And—it is always available from factory, field or distributor stocks, in a wide range of sizes.

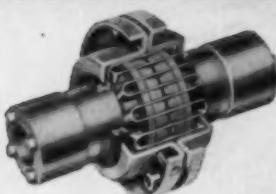
Write to Department 247 for engineering bulletin, including selection and dimension tables.

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

MANUFACTURERS OF:

• Motorreducers	• Single Helical Gears
• Speed Reducers	• Herringbone Gears
• Flexible Couplings	• Marine Drives
• Shaft Mounted Drives	• Steel Castings
• High Speed Drives	• Weldments
• Special Gear Drives	• Contract Machining

FALK
...a good name in industry

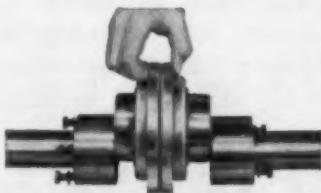


**The New
Type F Spacer Coupling**

Here is a Steelflex coupling specially designed to permit fast, easy installation and removal in horizontal and vertical applications where it is impracticable to move the connected units—or where a space-gap (up to 12 in.) is necessary.

Like all Steelflex couplings, the Type F Spacer gives long, trouble-free service and maximum 3-way protection for connected machinery: it provides torsional resilience to reduce shock and vibration; it accommodates parallel or angular shaft misalignment; it allows free (or limited) end float.

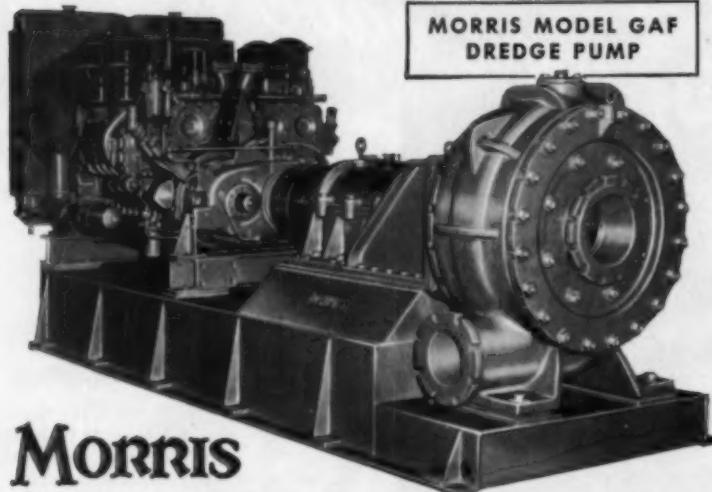
An outstanding feature of the Steelflex Spacer is that it can be installed or removed in one piece (see photo below); no dismantling or servicing of the coupling is required. Pump assemblies can be disconnected and removed without disassembling the coupling, without exposing working parts.



The Steelflex Spacer coupling is prelubricated at the factory and can be installed, or removed and reinstalled, without disturbing the lubricant—a highly desirable feature.



For COARSE REFUSE Disposal



MORRIS MODEL GAF
DREDGE PUMP

MORRIS DESIGN, PERFORMANCE, DURABILITY Gives PEAK Pumping Economy

The dredge pump is the vital heart of any successful dredging or hydraulicking operation. Its ability to maintain high vacuum and freedom from mechanical difficulty makes the difference between profit and loss.

Morris Dredge Pumps, with their superior design and built-in dependability will consistently develop and maintain the high vacuum necessary to profitable production.

Solids output of Morris Pumps so far exceeds that of ordinary pumps that contractors refer to them as their "secret weapon". Over 90 years experience in hydraulic design and testing are built in every Morris Pump. Let Morris help you "put more on the bank".

If you want to talk performance and durability write for Bulletin 184-A or contact your Morris representative.



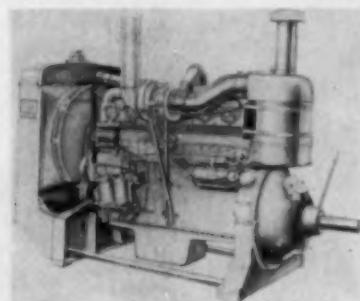
MORRIS MACHINE WORKS

Baldwinsville, N. Y.

Sales Offices in Principal Cities

Equipment News (Continued)

wing attachment is designed to ease problems of attaching wood or metal conveyor slats for all types of duty.

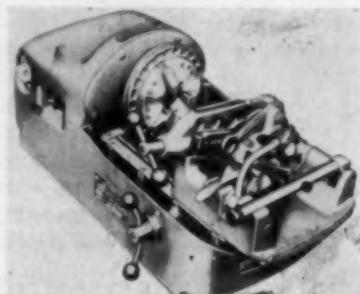


Turbo-Charged Engine

International Harvester Co. entered the turbocharged engine field last month with the 250-hp Turbotorque Model UDT-1091. The engine's 250-hp rating, which is brake horsepower attained at 1,500 rpm, is an increase of 50 hp over International's naturally-aspirated UD-1091, a counterpart of the UDT-1091. A six-cylinder unit, the engine is equipped with an exhaust gas-driven AiResearch turbocharger which moves 60% more air through a 14-in diameter air cleaner. The result, says International, is a cut in fuel consumption and higher power with lower exhaust gas temperatures.

Multi-Purpose Greases

Standard Oil Co. (Indiana) has developed what it calls the "Rykon" line of greases for multi-purpose applications. The company says the greases are especially useful where high temperature or excessive moisture conditions prevail. Development of Rykon began 5 yr ago at Standard Oil's Whiting, Ind., research laboratories. The result of research was the introduction of an organic thickener which is being added to four regular greases and three extreme pressure grades. The new thickener, says Standard Oil, makes greases more stable than any previous gelling agent.



Pipe, Bolt Machining

A new Beaver S-4 Speed-O-Matic pipe and bolt machine features a universal type die head which has three sets of high-speed steel dies and threads from

How KAISER STEEL Recovers 28 Mesh Coal

...Clarifies Process Water
for Reuse...

Closeup view of the 120 ft.
dia. Type S Dorr Thickener at
Kaiser Steel Co., Sunnyside, Utah.



The fine coal recovery system of Kaiser Steel Company's Coal Preparation Plant at Sunnyside, Utah, consists in part of a large settling tank which makes a 28 mesh separation from a feed of minus $\frac{1}{16}$ " washed coal and water. Approximately 30% of the settling tank overflow — 2500 GPM of water containing 52 TPH of minus 28

mesh solids — is then laundered to the 120 ft. dia. Dorr Thickener. From the Thickener underflow, Kaiser Steel has been obtaining a concentration approaching 40% solids by weight. The overflow from the Thickener is of sufficient clarity that fines entrained in the circulating process water may be closely controlled.

If you have a problem in the recovery of fine coal, Dorr-Oliver engineers can be of help to you. Write Dorr-Oliver Incorporated, Stamford, Connecticut, U. S. A.



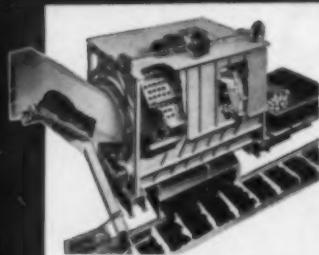
DORR-OLIVER

INCORPORATED

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT

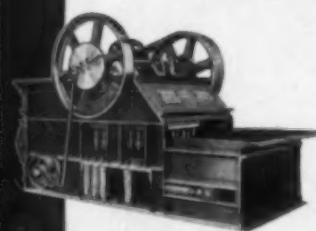
STAMFORD • CONNECTICUT • U. S. A.

**America's most
complete line of
CRUSHING EQUIPMENT**



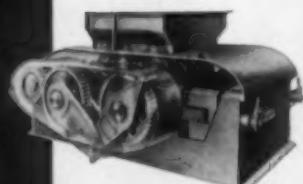
**McNally Pittsburgh
Rotary Breaker**

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



**McNally Norton Vertical
Pick Breaker**

50% less fines when reducing lump to egg and stove sizes.



**McNally Double Roll
Gearmatic ROM Breaker**

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.



**McNally Gearmatic Stoker
Coal Crusher**

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.

Equipment News (Continued)

$\frac{1}{2}$ in to 2 in. Manufactured by Beaver Pipe Tools, Inc., Warren, Ohio, the S-4 uses one universal die head and three sets of duo-type dies ($\frac{1}{2} \times \frac{3}{4}$, $1 \times \frac{1}{4}$, and $1 \frac{1}{2} \times 2$ in). Cutoff, die heads, and reamer are all pivot-mounted and swing out of the way when not in use. A special oiling tube directs cutting oil to the threading dies. The oil shuts off automatically when a tube is moved out of position.

Equipment Shorts

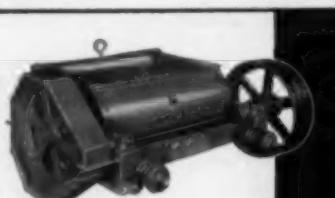
TRUCK BODY—The Heil Co. has introduced the HMT-11 dump body which, the company says, is designed for use with the Heil HMT 63-102 or HMT 63-117 head-mount telescopic hoist. Reportedly distortion and floor sag are virtually eliminated. Company address: The Heil Co., Milwaukee 1, Wis.

MOBILE RADIO—“T-Power” radiophones, or the new two-way radio units being built by Motorola incorporate a transistorized switching circuit in the power supply in place of a conventional vibrator. The idea is to eliminate the part most frequently replaced—the vibrator. Motorola, Inc., Communications and Electronics Div., 4501 W. Augusta Blvd., Chicago 51, Ill.

Free Bulletins

MOTORS, DRIVES—Westinghouse gearmotors and package drives are the subjects of Bulletin DB-3650, a publication available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. Horizontal, vertical, right angle, open, enclosed, explosion-proof, AC, and DC units are illustrated with respective reduction ratios and output speeds.

CRANES, SHOVELS—A 24-p catalog featuring Gar Wood Industries' 75B



McNally Single Roll Crusher
Universal application 20", 24" and 36" diameter rolls.

AVAILABLE
From Stock and on Short Delivery
For immediate action on complete information write,
wire, or call.

McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas

Wellston, Ohio

series of $\frac{3}{4}$ -yd power excavators is available from the company's Customer Service Dept., Wayne, Mich. Important parts and assemblies of the 75B and attachments are illustrated and described in detail.

TWO-STAGE CRUSHER—McLanahan & Stone Corp.'s two-stage crusher, or triple roll, is the subject of a new bulletin being distributed from the company's offices in Hollidaysburg, Pa. The crusher reduces ROM to fine sizes in a single pass.

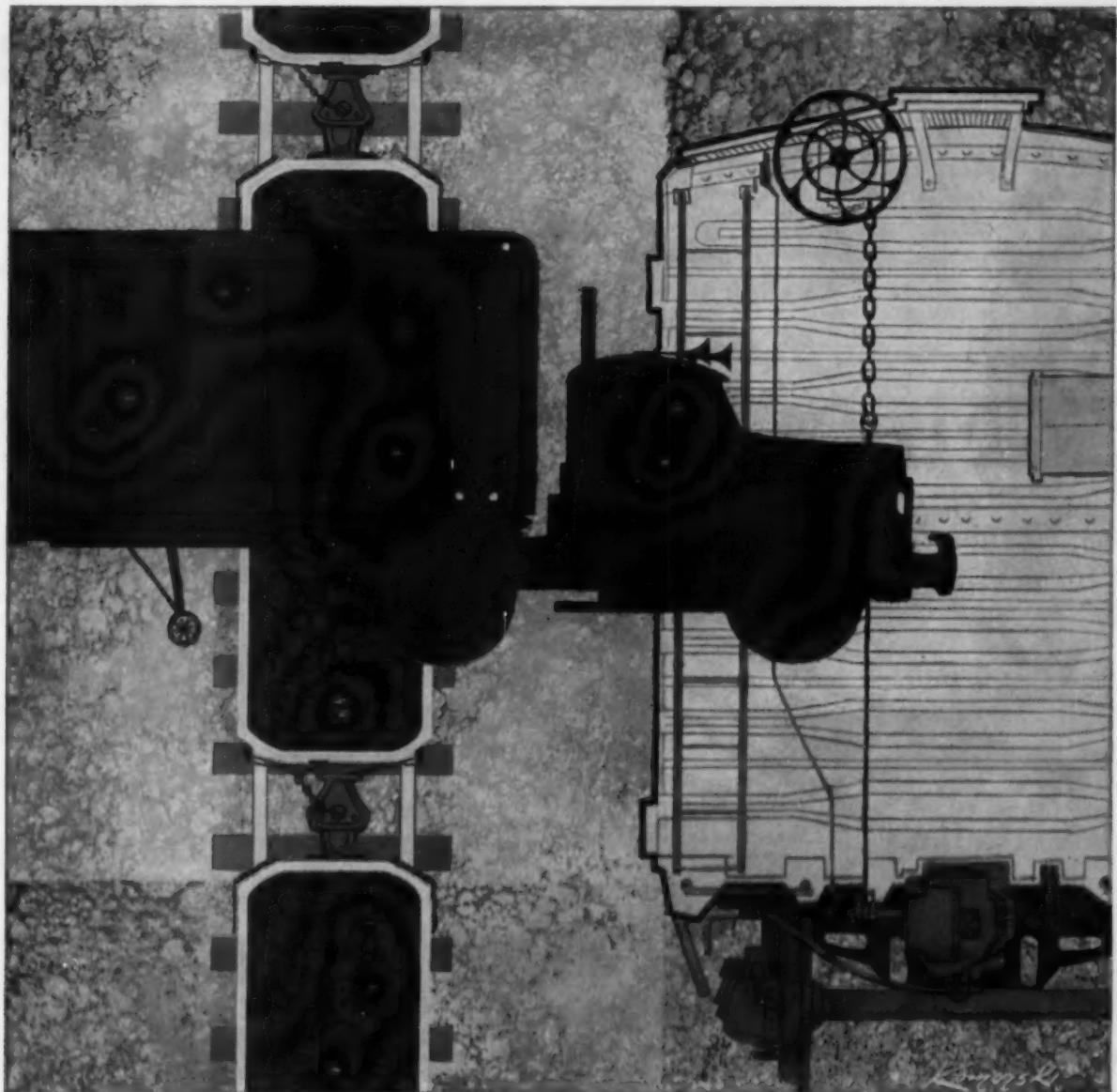
HOSES, DUCTS—Prices and design information of the Flexaust hose and Portovent duct products manufactured by the Flexaust Co., 100 Park Ave., New York, 17, N. Y., are contained in Bulletin 70. The hoses and ducts, the bulletin points out, are for moving air, dust, fumes and materials via pressure, suction and gravity.

MINING TOOLS—When to recondition carbide coal mining tools, grinding recommendations, and nomenclature of machine and roof bits are among the feature subjects of a 20-p mining tool catalog being distributed by General Electric's Metallurgical Products Dept., Detroit, Mich. The publication, CM-130, lists the company's line of Carboly carbide mining machine, roof, auger, and finger bits as well as specifications. It also includes a section covering service programs available to the coal mining industry, such as customer educational and mining engineering and laboratory facilities.

pH ELECTRODES—Beckman pH electrodes for laboratory and portable pH meters are listed and described in Bulletin 86-5, a publication of Scientific Instruments Div., Beckman Instruments, Inc., 2500 Fullerton Rd., Fullerton, Cal. The bulletin is laid out in chart form and is designed to guide users in selecting correct pH electrodes. Information on the Zeromatic and the Pocket pH meter is included.

BELT MATERIALS METERING—Any belt-conveyed, dry material can be automatically and continuously weighed and controlled by the Conveyolo meter, according to Bulletin 550-P5, a publication of the manufacturer Builders-Providence, Inc., 345 Harris Ave., Providence 1, R. I. The company, a division of B-I-F Industries, Inc., says “Conveyolo adapts easily to precision gravimetric feeding, or to pacing allied equipment in blending or proportioning processes.” The bulletin describes design features, principles of operation and dimensions.

VALVE SELECTION—Ohio Brass Co., Mansfield, Ohio, says that selecting the right O-B bronze gate valve is easy with a handy folder the company is distributing. The Folder (1323-Vr) contains a valve chart which includes number, pressure rating, size, type of pipe end,



JALTEN low alloy, high-strength J&L steel

provides
equal strength
with lighter
weight

Jalten permits high design loads with reduction in section. Usual reduction is two gages with weight saving as much as 25%.

High strength of Jalten is the result of balanced chemical composition, carefully controlled during production. Strength is retained through fabrication and welding without further heat treatment.

Jalten is available in the forms you require (plates, hot rolled sheets, hot rolled bars, small shapes and structurals). Jalten can be purchased in three grades to meet specific requirements for high strength, formability, impact, resistance to abrasion and corrosion.

Your local distributor can supply you with information on Jalten, or you can write direct to the Jones & Laughlin Steel Corporation, Dept. 411, 3 Gateway Center, Pittsburgh 30, Pennsylvania.



Jones & Laughlin
... a great name in steel

Equipment News (Continued)

and stem design of the company's bronze gate valves.

EQUIPMENT RESTORATION—"Operation Rehabilitation" is the title of Bulletin 55, a multi-page folder being distributed by the Maintenance Engineering Corp. to outline the company's method of restoring heavy industrial equipment. In addition the booklet describes the company's commercial inspection and consulting service, which is, in fact, a preventive maintenance program. "Mecostitch," service which

consists of restoring heavy castings, is also described in the bulletin.

In tackling a rehabilitation problem Maintenance Engineering examines machinery by using all known inspection methods, then determines the cause and extent of damage. The bulletin outlining the company's program is available from Box 10426, Pittsburgh 34, Pa.

SAFETY—Firth Sterling, Inc., is offering to mining companies Scotchlite reflective stickers which read "Be Careful, Buddy." The stickers, says Firth Sterling, can be placed on the side of mining helmets where they will be a constant reminder

of the necessity of safety. Firth Sterling will send them on request from its Mining Div., 3117 Forbes St., Pittsburgh 30, Pa.

WELDERS—Specifications and construction details of Lincoln Electric Co.'s Idealarc welders—300-, 400-, and 500-amp combination AC and DC units—can be found in a 4-p folder named Idealarc being distributed by the company. Features such as arc stabilizing and burn-out protection are included. Address: Cleveland 17, Ohio.

TRACTORS—"Ford Tractors and Their Industrial Applications" is a 12-p illustrated catalog showing Ford's tractors and industrial equipment in action. Included are abbreviated specifications covering all the equipment shown. Copies from Industrial Sales Dept., Tractor & Implement Div., Ford Motor Co., 2500 E. Maple Rd., Birmingham, Mich.

MOTORS, GEAR MOTORS—"The Moving Force of Industry" in eight pages describes the entire line of AC and DC motors, gearmotors, motor-generator sets, motor controls and packaged mechanical and electronic adjustable speed drives manufactured by Reliance Electric & Engineering Co. and the Reeves Pulley Div. The bulletin, No. A-2501, is available from Reliance at 24701 Euclid Ave., Cleveland 17, Ohio.

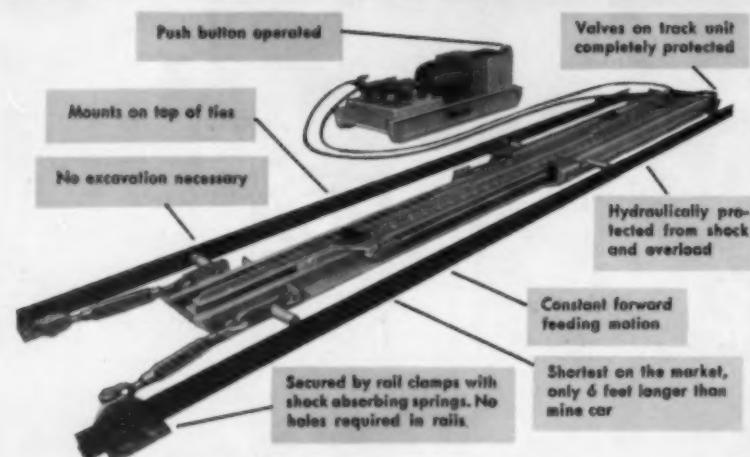
PLASTIC PIPE—Complete data and specifications for three grades of polyethylene pipe are among the features of a 16-p catalog describing Dur-X pipe, tubings, and fittings manufactured by Franklin Plastics, Inc., Franklin, Pa. The catalog also contains instructions and suggested methods for installing plastic pipe, in addition to typical applications.

PRESSURE REGULATORS—Air Reduction Sales Co., 150 E. 42d St., New York 17, N.Y., will send on request "Gas Regulators," a catalog dealing with various types of cylinder, manifold, and pipeline regulators, both single- and two-stage units. In addition, the catalog (No. 806) contains text on specialized equipment such as laboratory and metering regulators and gas proportioners.

POWER UNITS—Six new six-cylinder power units being manufactured by the International Harvester Co. are described and illustrated in Catalog CR-511-G, a publication of the company. Covered are the units' increased horsepower, carburetion, specifications, and performances on gasoline, LPG, and natural gas. The booklet is being distributed from the Construction Equipment Div., 180 N. Michigan Ave., Chicago 1, Ill.

SILICONE-BASED GREASE—The properties and performance of Dow Corning 41, a silicone-based grease developed for high-temperature, slow-

NOLAN Porta-Feeder



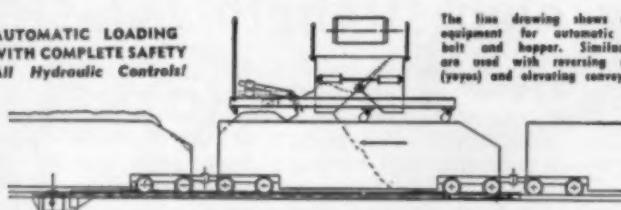
The only COMPLETE line of car-spotting and car-loading equipment available

Two NOLAN Porta-Feeder models will help you meet every requirement and condition in spotting cars for loading: 1. Direct Mechanical Drive, 2. Hydraulic Cylinder Type, Hose Coupled to Remote Power Unit (shown above).

There are hundreds of NOLAN Feeders in operation. There are some in your vicinity—ask us to show you how efficient NOLAN equipment can be in your operation.

AUTOMATIC LOADING WITH COMPLETE SAFETY
All Hydraulic Controls!

The line drawing shows arrangement of equipment for automatic loading from belt and hopper. Similar arrangements are used with reversing chain conveyors (yokes) and elevating conveyors.



NOLAN SALES AGENTS:

- George C. Hutchinson, Jr., 1304 Kuppen Building, Pittsburgh, Pa.
- Huntington Supply & Equipment Co., Huntington Nat'l Bank Bldg., Huntington, W. Va.
- John Lloyd & Sons, 33 Bennett Bldg., Wilkes-Barre, Pa.
- E. C. Harro Machinery Co., 1736 Champa Street, Denver 2, Colorado
- Frank C. Monnett, P.O. Box 154, Castle Gate, Utah
- Amos A. Culp, 429 South 26th Street, Birmingham 5, Alabama
- John North Associates, P.O. Box 105, Herkert, Mich. (Chicago District)



THE NOLAN COMPANY

106 Pennsylvania Street

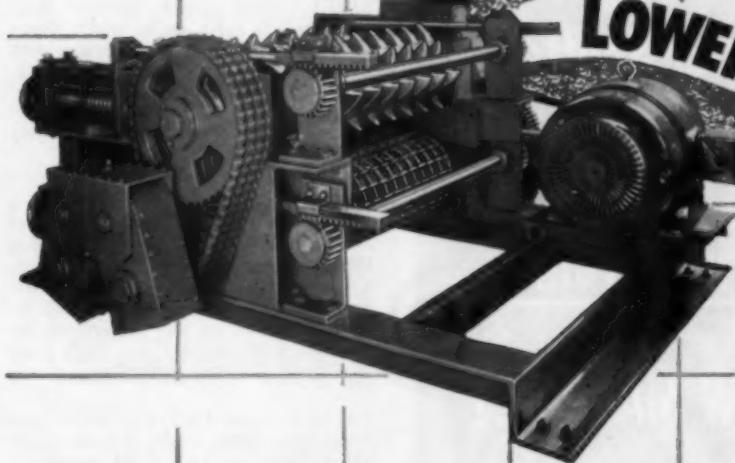
Bowerston, Ohio

the **HANNA*** story about... **GUNDLACH** crushers

The **GUNDLACH CRUSHER**
crushed more coal in 9 months
than previous crushers
crushed in a full year!

INCREASED PRODUCTION!

LOWER MAINTENANCE!



Or a Maintenance Cost of
32¢ per 1000 Tons!



In January 1956, Hanna's Georgetown, Ohio Preparation Plant, one of the largest coal cleaning plants in the United States, installed their first **GUNDLACH** Crusher which was required to reduce 7" x 1 1/4" washed coal to 1 1/4" top size at a rate of 350 TPH.

Prior to the installation of the **GUNDLACH** Crusher, Hanna encountered trouble with an oversize product (plus 1 1/4") overloading the recirculation screens and conveyors, which in effect decreased overall plant capacity.

Not only did the **GUNDLACH** Crusher more than meet the capacity required, but it also eliminated the overloading condition in the recirculating equipment which greatly increased overall plant capacity. In addition the **GUNDLACH** Crusher as compared to the crusher it replaced reduced the percentage of fines, consequently better screening resulted. It delivered an average of 390 TPH, crushing over a million tons from Jan. 13 to Oct. 31, 1956 and . . . at the relatively negligible low cost of only \$318.00 for total maintenance, broken down as follows:

Replacement Parts: (Includes welding rod for tooth build-ups).....	\$ 36.00
Labor: Hanna's actual cost for tooth build-ups and installation. (Some at overtime rate).....	\$282.00
Total cost per 1,000,000 tons.....	\$318.00

BECAUSE OF THE OUTSTANDING PERFORMANCE OF THIS CRUSHER, HANNA HAS RECENTLY PURCHASED FOUR MORE GUNDLACH TWO-STAGE CRUSHERS.

Perhaps we can help you as we have helped Hanna. We have a crushing engineer in your area, just give us a call.

T. J. GUNDLACH MACHINE CO.
DIVISION OF J. M. J. INDUSTRIES, INC.
BELLEVILLE, ILLINOIS

Equipment News (Continued)

speed bearings, are the subjects of a bulletin (Form 6-206) being distributed by Dow Corning Corp. from Midland, Mich. Applications of current use are featured.

PIPE AND COUPLINGS—Keasbey & Mattison Co., Ambler, Pa., is distributing a new brochure entitled "K&M Asbestos-Cement sewer pipe and its Fluid-Tite Coupling." In addition to listing various sizes and types of pipe and connections, the company describes features of the "Fluid-Tite" coupling, which has

withstood and external water pressure test of 25 psi.

CRAWLER TRACTOR 4-p specification sheet (MS-1191) containing information on the Allis-Chalmers HD-21 crawler tractor is available from the company's Construction Machinery Div., Milwaukee, Wis. Alongside a cutaway photo of the tractor the company has inserted marginal notes to point out mechanical design and construction features.

EVALUATING HAZARDS—Crouse Hinds Co. is distributing the "Hazard

Finder," an 8-p folder containing a check list of 13 questions that help determine whether uncontrolled inflammable gases, vapors, dust, liquids and other combustible materials are making a plant unsafe. A reader answers the questions then breaks a seal on the folder to help him locate hidden potentialities of electrically-ignited explosions. Dept HF, Crouse Hinds, Wolf & 7th North Sts., Syracuse, N.Y.

HARD SURFACING ELECTRODES—The Metal & Thermit Corp., Rahway, N.J., is offering a 20-p booklet covering Murex Hardex hard surfacing electrodes. Those electrodes which are best suited to different applications are pointed out and the physical and chemical properties of typical deposits are included.

STEEL BUILDINGS—"Armco Steel Buildings" is a 4-p folder which shows four types of buildings designed with Armco's Steelox panel method construction, in which panels of steel lock together to form load-bearing walls and roofs. Drawings and photographs illustrate the construction.

TRANSMISSION—The RoadRanger, a seven-speed transmission manufactured by the Fuller Mfg. Co., Transmission Div., Kalamazoo, Mich., is described in a cartoon style booklet published by the company. The booklet's chief aim is to instruct drivers on how to handle the single-stick seven-speed unit under various traffic and terrain conditions.

VALVES—Crane Co.'s new folder covering brass globe, angle, and lift check valves points out features of the valve's composition disc. Quickly changed, according to Crane, the composition disc can be replaced without removing the valve body. Address: 836 S. Michigan Ave., Chicago 5, Ill.

WELDED PLATE—The Colorado Fuel & Iron Corp. is distributing a 4-p folder on Claymont fully-welded steel plate sections. The booklet describes the higher strength of the welded sections, comparing them with riveted types. Copies from 575 Madison Ave., New York 21, N.Y.

INDUSTRIAL FANS—A 24-p bulletin being distributed by the Chicago Blower Corp. explains construction, operations and specifications of a rugged line of fans designed for heavy industry, commercial applications, and miscellaneous buildings. The bulletin, MD 102, describes direct drive units and V-belt fans. Address: Chicago Blower Corp., 9863 Pacific Ave., Franklin Park, Ill.

CHAINBLOCK SAFETY—A safety wall chart illustrating the correct way of safely handling chain blocks has been published by the Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Muskegon, Mich. The do's and don'ts of chain block safety are illustrated with 18 easily understood drawings. The company makes no attempt on the chart to sell its products, selling safety only.

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NEWS ROUND-UP

Florida Utility Fuel Needs Could Hit 12 Million Tons

As much as 12 million tons of bituminous coal could be flowing into Florida's power stations by 1961 via rail, river, the Gulf of Mexico and the Atlantic Ocean.

This was the conclusion drawn by some industry optimists last month after a meeting in Miami among Florida utilities, southern coal producers and railroad executives who met to explore the possibility of converting Florida's power plants from oil burners to oil and coal burners.

And although coal industry conservatives scoffed at the high figure and offered their own low one of 2 million tons they also agreed that 2 million tons was a minimum.

To sideline observers the diverse estimates were reflections of the current phase of negotiation—a phase of exploration.

Florida's utilities, faced with the problem of doubling fuel requirements in the next 5 yr, are groping for relief from a fuel problem that involves both price and availability.

The fuel—residual oil—has always powered their generating units. And, unlike other utilities, Florida's utilities, with one exception, are equipped to

burn only oil under their boilers.

Since 1940 prices have moved in an upward trend except for a few short and sharp downward swings. As an example the average delivered cost per barrel today in the Miami area is about \$3. In 1940 the price was \$1. In 1953 it was \$2.

Thus, squirming under the pressure of constantly rising oil prices, saddled with plants that burned only oil, and unable to pay the high cost of rail-borne coal, Florida's chief utilities turned to natural gas. But here, too, they faced a block when their efforts produced only a limited quantity (on a firm basis) of only 2 million tons of coal equivalent annually.

Their next move was made in Washington, D. C., where they sought relief from their dependence on oil through legislation. In February, 1957, Florida's representatives urged the Senate Antitrust and Monopoly Committee to take action against oil prices.

But the result proved to be not immediate legislative action but immediate reaction from Sen. Thruston B. Morton (D-KY), who initiated a series of meetings in Washington and elsewhere among Florida's utilities, southern coal producers and southern railroads. The development for a new coal market seemed possible.

Out of the meetings came a request to Appalachian Coals, Inc., to study the entire Florida fuels picture. The result was the H. B. Lammers report, a detailed engineering study, which provided the basis of discussion at last month's Miami meeting.

Outsiders, although not present at the actual meeting, believe that these five major points formed the basis of discussion:

1. Sharp price rises can be expected in oil and gas during the next 5, 10- and 15-yr periods. Meanwhile, coal will remain relatively stable over the long term with possibilities of short term price declines on a delivered basis.

2. Since uninterrupted generating operation is a necessity, and since gas and oil cannot be economically stockpiled in volume, the relative ease of stocking coal would insure uninterrupted generation.

3. Conversions among existing power stations should be considered now, since there may be a possibility of having to face costly emergencies.

4. New plants should include facilities for coal handling and coal firing, since later additions will cost 15 to 25% more.

5. Exploration of long term contracts involving both coal and transportation may result in establishing competitive delivered prices on coal at a number of plants.

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Invasion of Oil, Gas Markets Is Predicted

The possibility of coal setting up marketing shops in the front yards of primary oil and gas marketing strongholds may emerge as a distinct eventuality in a few years, according to Joseph R. Forsythe, general manager of the *Keystone Coal Buyers Manual*.

Speaking before a group of central Pennsylvania coal operators at a meeting of the Somerset County Coal Operators Association, Somerset, Pa., Mr. Forsythe said that a number of major electric utility companies are studying the possibility of supplementing oil and gas with coal.

The result could be, he said, the partial capture of such "undreamed markets as Florida, Louisiana, Texas, Oklahoma and California." He pointed out that Florida already has moved in the direction of coal. Developments show Mr. Forsythe declared, that Florida's utilities already plan to burn 2 million tons a year by 1961, with a possible potential of another 10 million.

In his address, the subject of which was "Potentials Ahead for Bituminous Coal," Mr. Forsythe said that a number of industrial companies also in Florida are already considering converting oil burning plants to coal.

Pointing out that today's coal industry is a strong industry, he attributed its strength to breakthroughs in: 1) knowledge leading to new mining techniques which have resulted in more efficient production; 2) changed attitudes toward merchandizing, public relations and research with a resulting change in public opinion; 3) cooperation with customers to determine not only how to improve the coal product, but how to improve the efficiency of the customer's handling and burning techniques; 4) establishment of labor relations that have resulted in 7 yr of peace and cooperative efforts by labor to promote markets; 5) development of new methods of transportation

Bituminous Output

YEAR TO DATE	PRODUCTION
July 20, 1957	269,791,000
July 21, 1956	271,569,000

1957 output 0.7% behind 1956.

A month earlier output was 1.9% behind 1956.

WEEK ENDING	PRODUCTION
July 20, 1957	10,080,000
July 21, 1956	9,047,000

Anthracite Output

YEAR TO DATE	PRODUCTION
July 20, 1957	14,030,000
July 21, 1956	14,747,000

1957 output 4.9% behind 1956.

A month earlier 1957 output was 2.3% behind 1956.

WEEK ENDING	PRODUCTION
July 20, 1957	437,000
July 21, 1956	579,000

MINING MACHINE AND LOAD SCRAPER AND DOZER ROPE- SLUSHER ROPE-WINCH LINE INCLINE SHOVEL MINE HOIST AND LOAD -SLUSHI STRIP SHOVEL AND DRAGLIN MINE HOIST WINCH LINES AND LOADER INCLINE ROPE DOZER ROPE



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Exporters Hit U. S. Loan To Prop Polish Mining

The Coal Exporters Association has protested an Export-Import Bank loan to Poland for the purchase of coal mining machinery and equipment. The association says the equipment and machinery "are designed to materially increase production of Polish coal for the world export market."

In its protest the association noted current Polish plans to increase shipments of coal to Argentina and to Western European customers of American coal. "We cannot take issue with

Poland in her effort to expand her coal production," the protest read. "We can, and do, take issue with the policy of our own government in lending American dollars to a satellite or pseudo-satellite nation with which to bolster and strengthen the ability of the nation to compete with U. S. produced coal."

The Export-Import Bank's loan of \$30 million includes a \$4 million fund for the purchase of mining machinery and equipment.

News Briefs

The Rochester & Pittsburgh Coal Co. is reopening Margaret mine, Margaret, Pa.

The mine has been idle since 1932.

Meetings
International Briquetting Association, Biennial Conference, Aug 19-21, Colorado Hotel, Glenwood Springs, Colo.

The Baltimore & Ohio RR is planning to rebuild its Rural Valley Branch to serve the Margaret operation.

The Clint Meadows Coal Co., Dawson Springs, Ky., suspended operations in an underground mine near Beulah, Ky.

Officials said the company's coal rights had been worked out. The mine employed 75 men.

Twin Star Industries, Inc., sold its Dakota Collieries Lignite Div. to the North American Coal Co.

Twin Star disclosed no details of the sale, except that the company "is presently emphasizing the development of lignite and the operation on non-metallic mineral properties in Texas and the southwest."

A drainage project designed to protect one of the largest anthracite mines in the Shamokin, Pa., area was approved by the Dept. of Interior.

To protect the area against flooding Interior authorized the most extensive surface operation yet under a \$17 million state and federal mine drainage program. The work in the Shamokin area is expected to cost about \$250,000. The site of the project will be the Glen Burn No. 14 slope mine, 2 mi west of Shamokin. Operate by the Susquehanna Div., M. A. Hanna Co., the mine employs about 200 men and produces some 330 mine cars of coal each day. The Bureau of Mines, which recommended approval of the project says that water pumping from No. 14 increased nearly 90% between 1954 and 1955. The load is expected to increase even more rapidly as mining is extended. The new project will be designed to divert surface runoff and convey it to Shamokin Creek, a tributary of the Susquehanna River.



BIGGEST YET—The Marion Type 5760, or the River King, before beginning full time operations at the Peabody Coal Co.'s River King mine, Freeburg, Ill. Reportedly the shovel is equipped with a 70-yd bucket, surpassing Hanna Coal Co.'s 65-yd Mountaineer and Peabody's 55-yd River Queen. Like its counterparts the River King was built at the mine. It will remove overburden which is 80 ft deep in some areas of the Freeburg mine while a smaller Bucyrus-Erie shovel will load 60-ton Euclid truck with coal. The shovel and a new preparation plant at Freeburg are part of Peabody's \$38 million coal development program in southern Illinois. Construction of the River King, which began in January, required 6 mo. Its builder, Marion Power Shovel, shipped it to the mine site in 75 freight cars.

Pennsylvania Power & Light Co.'s president Charles E. Oakes declared that atomic power is "leverage against rising coal (and other fuel costs.)"

Speaking before a group of security analysts and investment bankers in New York's Downtown Athletic Club, Mr. Oakes said that if Pennsylvania Power & Light's consumption of coal remained the same in the next 20 yr annual rises of 25c a ton in coal prices would raise his fuel cost by \$210 million. Based on expected additions to generating capacity, he added the fuel bill would move up \$143.5 more. "Hence," Mr.



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"Formula 5" is the safest, most effective freeze proofing compound you can buy. Morton "Formula 5" is specially compounded to meet the requirements set up by coal producers. Unlike ordinary freeze proofing compounds that contain corrosive chlorides, non-toxic "Formula 5" has a rust inhibitor added to help protect you (and your customers) against corrosion of motors, conveyors and other equipment.

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In addition to being a multi-purpose freeze proofing compound, "Formula 5" needs no mixing, no special handling. It won't cause costly delays by caking or lumping in feeders. It's a free-flowing product composed of chemically treated sodium chloride (30-70 mesh) and a special anti-corrosive compound. Just apply dry direct to coal.

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Oakes said, "we feel the best way to avoid such a mess is to hasten the development of competitive nuclear power."

The Louisville & Nashville RR plans to build an Elkhorn coal field spur in Kentucky's Letcher County to serve a mine being developed by the South East Coal Co.

The mine is near Sapphire, Ky. South East expects to load 100,000 tons of coal the first year. The L&N will extend its tracks from the Camp Branch spur, Pat, Ky.

Coal dock companies in the Lake Superior region formed the Coal Burning Equipment Co.

The dock companies believe that substantial coal installations and conversions from other fuels can be obtained through a hard-hitting sales campaign, which they say will be backed with facts. Coal Burning Equipment Co. will be the corporate instrument through which the dock companies will work. Operations will cover a seven-state area which includes Minnesota, North Dakota, South Dakota, Iowa, Wisconsin, upper Michigan and Nebraska. Headquarters will be at 128 North Third St., Minneapolis. Coal Burning Equipment will aim its sales program at homes and industrial plants.

A minor earthquake caused the deaths by gas suffocation of three miners at the Castle Gate, Utah, mine

of the Independent Coal & Coke Co.

The deaths occurred on the morning of July 18 when black damp from old workings, which had been sealed by concrete bulkheads, seeped into the present workings when the quake hit the area. Mine superintendent Donald Newberry said the quake was responsible for the deaths of the men, who were identified as Ilo Brady, 58; Wesley Parker Bailey, 41; and Harold Lee Wilstead, 32. The quake toppled rocks from the cliffs above Castle Gate. Later, residents reported feeling earth tremors.

Coal led the freight rate index of the steamship charter market to its lowest point in more than 3½ yr.

Shipping rates on coal plummeted almost 25% until single-voyage steamship charters were being made from Hampton Roads, Va., to Antwerp-Rotterdam at \$5.11 a ton by mid-July. The rate to western Italy was \$6.50. Slightly more than 7 mo ago overseas-bound coal was being shipped at a rate of \$16.59 a ton on the Antwerp-Rotterdam run. Even higher rates had prevailed on other commodities.

Miners employed by the No. 1 mine, Tioga Coal Corp., Richwood, W. Va., completed a 10-wk course in mine safety.

Each employee attended one class a week. The hazards stressed were roof falls; haulage, especially belt haulage; dust, as it affects health; and dust explosions.

Correction

In the June issue of *Coal Age's* News Roundup it was reported on p 146 that the Westmoreland Coal Co. was planning to spend \$10 million to develop an underground mine 12 mi from Clothier, W. Va. The report of development was correct, the \$10-million expenditure figure was not. Westmoreland, in fact, plans to spend between \$4.5 and \$5 million to develop the mine.

Cleveland's McDowell Co. began the first phase of constructing the Chesapeake & Ohio's \$7 million coal dock at Presque Isle.

The dock's capacity, when finished in mid-1958, will be 6,000 tph. Its McDowell coal-handling system, in anticipation of St. Lawrence Seaway construction, is tailored to the needs of ocean-going vessels. The dock will add 40% to the C&O's coal handling capacity in Toledo, already a major Great Lakes port for coals from West Virginia and Kentucky.

Preparation Facilities

Clinchfield Coal Corp., Compass No. 3, Dola, W. Va.—Contract closed with the Industrial Engineering & Construction Co., Inc., for a drying installation, including two Baughman dryers, to dry $\frac{3}{4} \times \frac{1}{4}$ -in. coal at 120 tph. The installa-

EQUIPMENT APPROVALS

Fourteen approvals of permissible equipment were issued by the U. S. Bureau of Mines during June.

Harris Pump & Supply Co.—Model 2A1EL mine pump; one motor, one hp, 550 v, DC. Approval 2-1257A, June 4.

Jay Mfg. Co.—Types 15SC1PE-1 (as modified by SBM8941) and 15SC1PXE-1 shuttle cars; five motors, one 15 hp, two $7\frac{1}{2}$ hp, and two 25 hp, 250 v, DC. Approval 2-1258, June 12.

Goodman Mfg. Co.—Type 402 borer; five motors, two 100 hp, two 10 hp, and one $7\frac{1}{2}$ hp, 250 v, DC. Approval 2-1259, June 13.

Jay Mfg. Co.—Type X855-37 30-in bridge conveyor; two motors, each 4 hp, 500 v, DC. Approval 2-1122A, June 18. (Approval 2-1122 covering 250-v conveyors of this type was issued to Jay Mfg. Co. Jan. 31, 1956.)

Acme Machinery Co.—Model 275-

A4J air compressor; one motor, 75 hp, 230 v, DC. Approval 2-1260, June 19.

National Mine Service Co.—Rebuilt Joy 11BU-11APE loading machine; two motors, one 50 hp, one 4 hp, 250 v, DC. Approval 2-1261, June 19.

Jay Mfg. Co.—Types 5CM-1AE/5CM-1AF continuous miners; five motors, one 30 hp, two 10 hp, and two 100 hp, 250/500 v, DC. Approvals 2-1262 and 2-1262A, June 20.

Acme Machinery Co.—Model HS-4AC drill truck; one motor 40 hp, 440 v, AC. Approval 2-1263A, June 20.

Jay Mfg. Co.—Types 6SC4PE-4/6SC4PXE-4 shuttle cars; three motors, two $7\frac{1}{2}$ hp, one 10 hp, 250 v, DC. Approval 2-1264, June 24.

Jay Mfg. Co.—Types 6SC4BPE-4/6SC4BPXE-4 and 6SC4BPF-4/6SC4-BPXF-4 shuttle cars; three motors, each 10 hp, 250/500 v, DC. Approvals

2-1265 and 2-1265A, June 25.

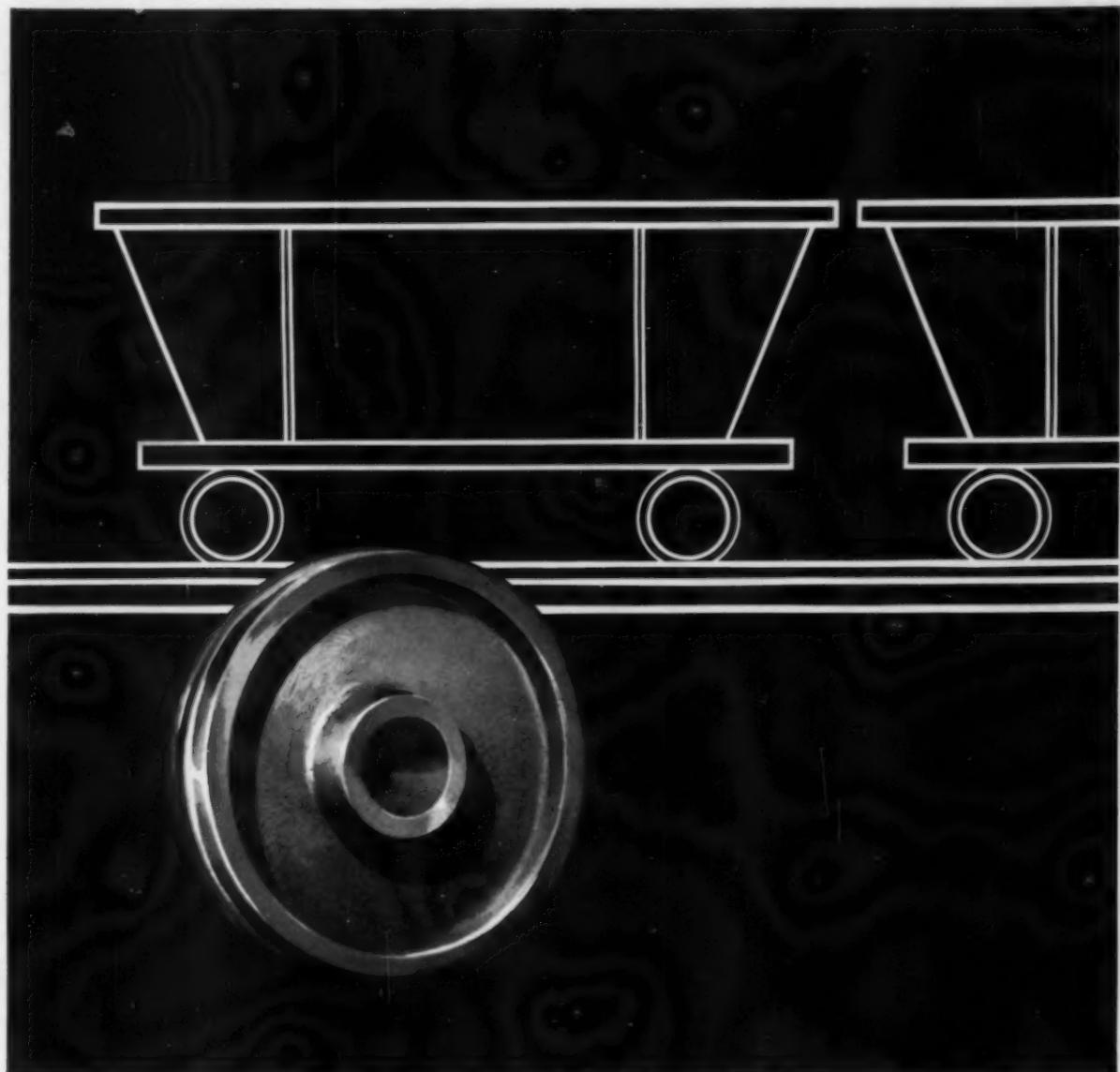
Acme Machinery Co.—Model 275T air compressor; one motor, 65 hp, 250 v, DC. Approval 2-1266, June 25.

Mine Safety Appliances Co.—Slurry rock dust distributor; one motor, 5 hp, 440 v, AC. Approval 2-1267A, June 25.

Jay Mfg. Co.—Type 5CM-1BF continuous miner; five motors; one 30 hp, two 10 hp, and two 100 hp, 500 v, DC. Approval 2-1247A, June 25. (Approval 2-1247 covering 250-v miners of this type was issued May 9, 1957.)

Mine Safety Appliances Co.—Slurry rock dust distributor; one motor, 5 hp, 550 v, DC. Approval 2-1245, June 27. (Approval 2-1245 covering 250-v distributors of this type was issued May 8, 1957.)

In addition the USBM extended symbol 102BM covering four cable manufactured by the Anaconda Wire & Cable Co. as damage resistant.



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Nakta was developed by years of Esso research to meet the exacting requirements of mine car wheel lubrication. Its excellent lubricating properties have been *proved* in millions of miles of actual service.

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adheres strongly to metal surfaces . . . sharply reduces grease loss through leakage, permits much *longer* periods between lubrications. Because of its good structural stability, Nakta is perfect for central lubrication systems.

Nakta is available in *six* consistency grades . . . plus a harder grade with graphite (Van Nakta 2). Find out more about Nakta from your nearest Esso Standard Oil Co. Division Office: Boston; Pelham, N. Y.; Elizabeth, N. J.; Bala-Cynwyd, Pa.; Baltimore; Richmond; Charlotte; Columbia, S. C.; Memphis; New Orleans.

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Portable Power Cable 2-4 Conductor Type G
2-6 Conductor Type W



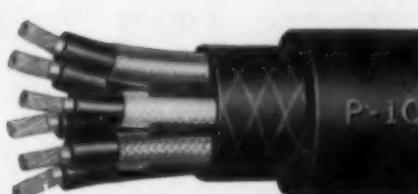
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News Roundup (Continued)

tion is an addition to the present preparation plant. Completion date, first quarter, 1958.

Clinchfield Coal Corp., Compass No. 3, Dola, W. Va.—Contract closed with the Industrial Engineering & Construction Co., Inc., for crushed coal rescreening facilities to handle 5x $\frac{3}{4}$ -in. coal after it is crushed to 1 $\frac{1}{4}$ in. at a rate of 200 tph. Facilities are an addition to the present plant. Probable completion date, fourth quarter, 1957.

Westmoreland Coal Co., Clothier, W. Va.—Contract closed with the Eimco Corp. for one 12-disc Agidisc to handle 35 tph clean coal and one 12-disc Agidisc refuse filter to handle 17 tph of refuse. Probable completion date, February, 1958.

Edith Faye Coal Co., Grundy, Va.—Contract closed with the Jeffrey Mfg. Co. for a No. 100 unit washery to wash 75 tph of 5x $\frac{3}{4}$ coal.

Leeton Coal Co., Grundy, Va.—Contract closed with the Jeffrey Mfg. Co. for a No. 100 unit washery to wash 5x $\frac{3}{4}$ coal.

Universal Coal Corp., Richlands, Va.—Contract closed with the Jeffrey Mfg. Co. for a No. 100 unit washery to wash 75 tph 5 $\frac{3}{4}$ coal.

Westmoreland Coal Co., Philadelphia, Pa.—Contract closed for an 84-in. three-compartment, eight-cell Baum jig to handle 475 tph. Equipment is scheduled for installation at the company's Hampton mine.

Bessie mine, United States Pipe & Foundry Co., Maben, Ala.—Contract closed with the Deister Concentrator Co., Inc., for a SuperDuty diagonal deck No. 7 coal washing table.

Jamison Coal & Coke Co., Loveridge mine, Fairview, W. Va.—Contract closed with the Deister Concentrator Co., Inc., for 12 "77" diagonal deck coal washing tables and two six-way split and two three-way split Concenco Model 108 revolving feed distributors.

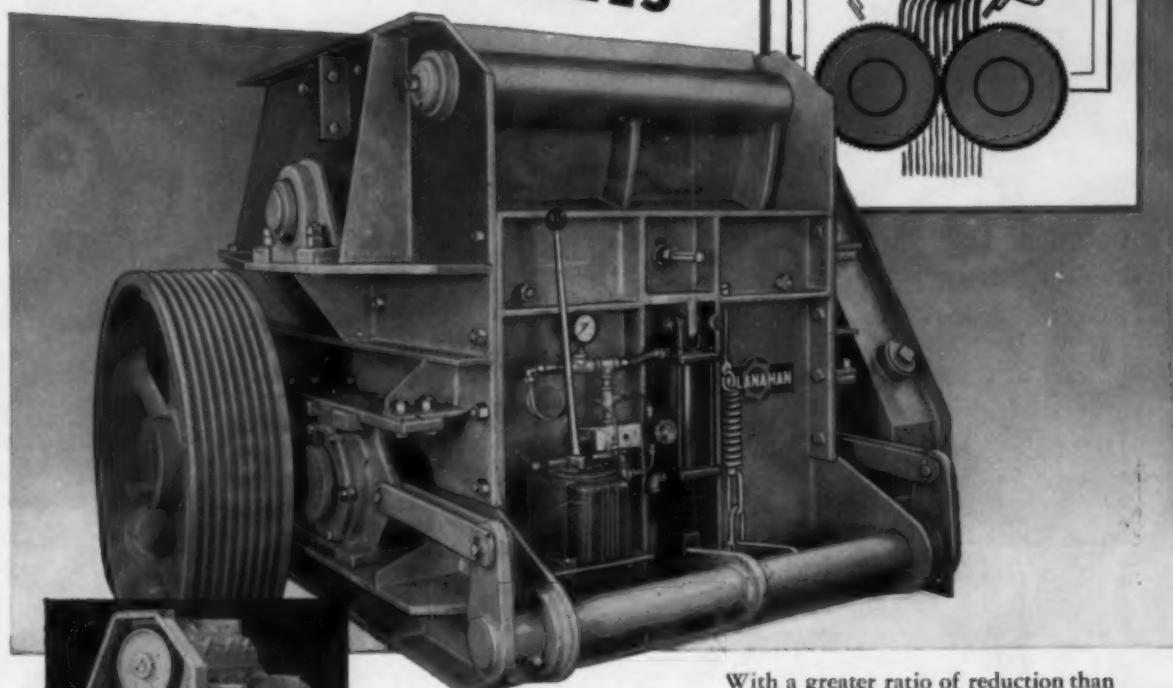
Island Creek Coal Co., Mine 17, Red Jacket, W. Va.—Contract closed with the Deister Concentrator Co., Inc., for one eight-way split Concenco revolving feed distributor Model 108 for feed distribution to four Concenco "77" diagonal deck washing tables.

Earnings Reported

Philadelphia & Reading Corp.—Net income \$2,802,976, or \$2.38 a share for the 6 mo ending June 30, 1957. In the same period last year net income was \$3,377,074, or \$2.67 a share.

Island Creek Coal Co. and subsidiaries—Net income \$4,909,203, or \$2.26 a share for the 6 mo ending June 30, 1957. In the same period last year net income was \$3,921,698, or \$1.83 a share.

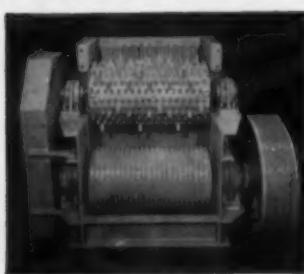
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One drive, running in a sealed oil bath, operates all three rolls.

With a greater ratio of reduction than ever before available, this highly efficient crusher delivers a better product with a minimum of fines. The single roll crushes the primary feed against a curved crushing plate; and the two lower double rolls perform the secondary reduction. Product size can be controlled quickly by a unique hydraulic adjustment system, which also protects against uncrushable materials.

Write for Bulletin No. BDTR-57.



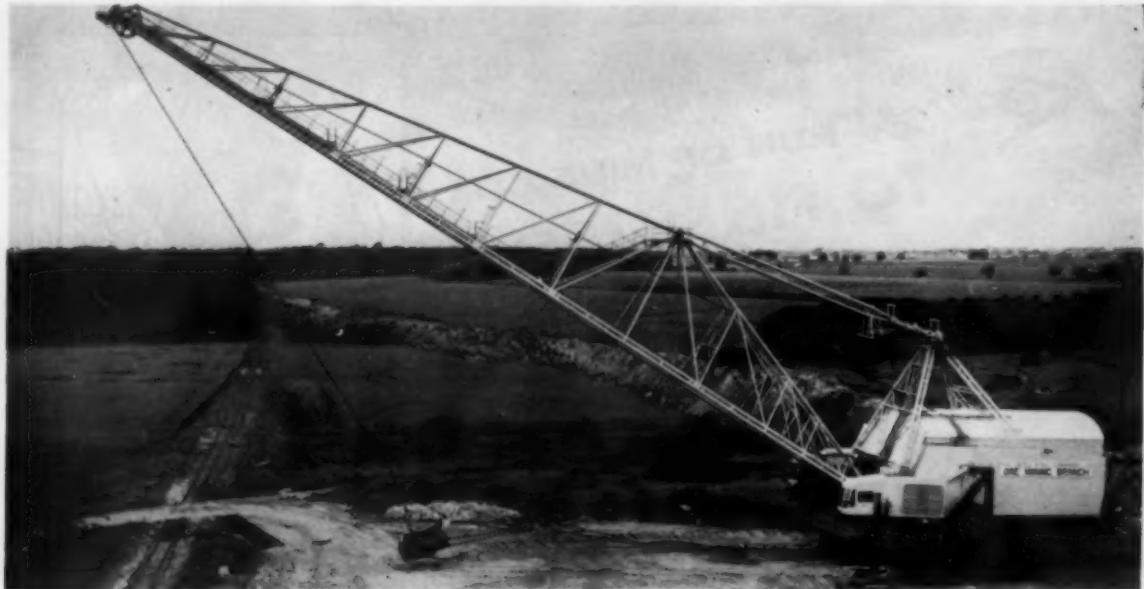
Simplicity of design was of prime consideration in developing this crusher.



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282-FT BOOM, the longest ever built, is a principal feature of the British W-1400 dragline. Bucket yd capacity is 20 or 30 tons. Relative size of the dragline can be seen by noting the size of the bulldozer beneath the dragline cabin.



Dragline Wields A 282-Ft Boom

by JOHN TUNSTALL

London Bureau

McGraw-Hill World News

Wielding a new type boom 282 ft long—reportedly the largest ever built—Britain's newest dragline, a self-balanced or unballasted machine, last month joined a growing world army of bigger and bigger earthmovers.

Built by Ransomes and Rapier for removing limestone overburden at an open pit iron mine, the dragline is equipped with a 20-yd bucket which will pick up 30-ton bites.

The mine at which the machine is installed is situated on a 3,000-acre site at Stamford in Lincolnshire. Its owner, the Ore Div., United Steel Cos., Ltd., expects to strip at an initial rate of 20,000 tons of ore a week. Later, tonnage will fall to 10,000 a week as maximum overburden depths between 80 and 90 ft are reached.

Since the dragline's weight is 1,700 tons its parts were fabricated and shipped to the mine site for erection. To meet the unit's \$2.25 million cost operational economics are being based on completion of a 20-yr life on the site working a three-shift day six days a week.

The most outstanding feature of the

DESIGN OF RIGID BOOM eliminates suspension for first time. Structural steel is tubular.

dragline is its rigid boom, which represents a major departure from normal boom suspension and fabrication. Not only is the boom fabricated from high tensile tubular steel, but it is the first boom to dispense entirely with rope suspensions or intermediate wire bracings. Small elevation adjustments are made by a special flexible fabricated steel link. R. Cameron, chief designer of Ransomes and Rapier, explained to McGraw-Hill World News that even with a completely cantilevered boom stresses are actually lower than those occurring with rope-suspended booms.

In operation the Ransomes and Rapier dragline can take a 27-ton bite from a cut 50 ft below ground level at a 120-ft radius, hoist up to 104 ft above ground level, slew through 90 deg, drop and lower its bucket and reverse to digging position in a 61-sec cycle. Its jib head reaches speeds to 23 mph.

Alternatively, it can dig 50 ft above ground level, hoist its bite another 54 ft, slew through 180 deg, lower and reverse to digging position in 80 sec. Its makers say that maximum capacity is 1,700 tph.

Two men—one a standby mechanic—are all the crew needed to operate the dragline. Using improved Ward Leonard controls and practices basically similar to standard traveling crane practice, an operator controls all movement from a pressurized and air-conditioned cabin. The additional pressure amounts to 2 psi above atmosphere to assist cooling and prevent dust admission.

The dragline is fed from a 6.6-kv AC



Want to strip more overburden-faster?

**Allison Engineering Co. uses a Turbocharged
CAT* D9 Tractor with No. 9S Bulldozer
on its Sligo, Pa., operation!**

Look at the load on this D9's blade! Pass after pass this giant moves big yardage for Allison Engineering Co. Production here averages about 450 tons of coal a day. The D9, working ahead of a 3-yard dragline, strips 9 yards of overburden in the same time the dragline makes a complete swing. With typical Caterpillar dependability, it's on the job steadily 16 to 20 hours, 6 days a week.

Everything about the giant D9 is engineered for big production. It balances 320 flywheel horsepower with 35-ton heft to roll big loads ahead of the blade. Its Turbocharger, driven by the engine exhaust, packs air into the engine according to engine load, not engine speed, for more working power. Hydraulic boosters provide easy steering, braking and master clutch use. Its single lever control starting system provides sure

starts. And the D9 is easy to service. For example, oil clutch, torque converter, transmission and steering clutches each can be removed individually without disturbing other components.

For bigger production at lower costs, there's no tractor built that can match the D9. To meet your needs, it's available with torque converter or direct drive with oil clutch. Want a firsthand picture of how the D9 can step up your production? Just name the date—your Caterpillar Dealer will gladly demonstrate on your job.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

**WANTED—
THE HARD WORK**

Foreign News (Continued)

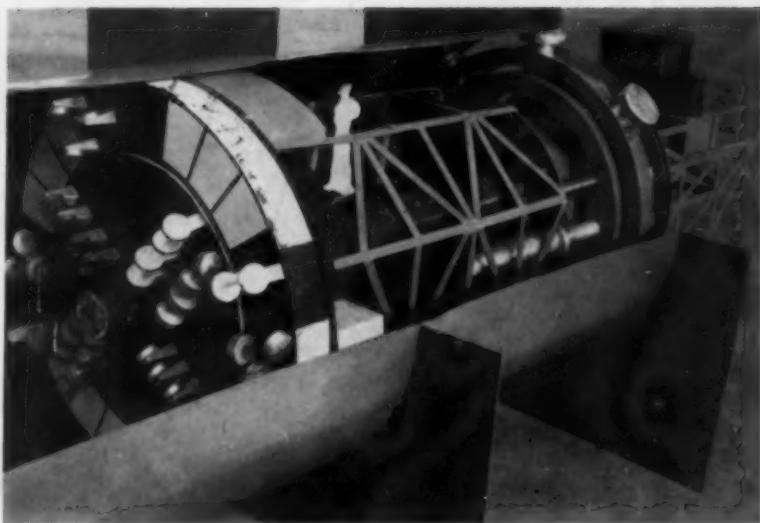
grid supply through a trailing cable. Current is fed to two 1,500-hp DC generators which supply 14 identical 225-hp motors. A design feature is the use of balanced input drives to each dragline motion, using separately motorized and diametrically opposed pinions to the output spur gear for each motion. The arrangement is said to reduce tooth loading and to relieve the shaft of bending loads.

In addition to the dragline's two control cabins, engine rooms and other areas of the house are pressurized and cooled. Air conditioning and pressurization equipment can handle 60,000 cu ft of air per min.

Other specifications: maximum drag ropes load, 182 tons; rope circumference, 7 in; maximum drum load, 100 tons; lubrication, automatic.

Hard Rock Borer

For innumerable mining years innumerable mining men have approached the problem of tunneling through hard formations by applying a universally time-tested but time-consuming method—drilling, blasting, and loading. Although drills were improved, explosives improved and carrier equipment improved to lop off hours, days and weeks, the cycle,



MODEL OF HARD ROCK TUNNELING MACHINE shows counter-revolving disk head used for cutting and jacks at rear for anchorage. The British are building one with an 18-ft diameter disk that is expected to cut in hard sandstones at a rate of 200 yd a week.

inherently a time-consumer, remained basically unchanged.

Thus, more than casual interest was aroused by the National Coal Board's Central Engineering Establishment last month when it unveiled a prototype

mechanical tunneling machine which, the CEE said, would churn through the hardest sandstones found among British coal formations at a rate which rivalled the cutting rates of continuous miners.

Working two shifts a day, said the

SIMPLEX MINE JACKS

6 WAYS BETTER

- ★ Ratchet lowering lever type for speed with safety
- ★ 5-ton capacity (other models to 35 tons)
- ★ Double-lever sockets permit lifting in close quarters
- ★ Full capacity on cap OR GROOVED toe
- ★ Safety Speed Trigger
- ★ Ideal for re-railing, repairs, skidding

No. 84A
for Thin
Seams 14" high,
7" lift

No. 85A
for Medium
Seams 17" high,
10" lift



No. 86A
for Thick
Seams 20" high,
13" lift



Hi-Speed TIMBER JACK

MODEL NO. 642 LIFTS 6 TONS

Combined safety of screw jack with fast action of crank. Hand swivels. Five models with min. ht. from 3'6", max. ht. to 9'6".



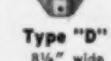
3 TYPES OF HEADS



Type "F"
10 1/4" wide



Type "D"
8 1/8" wide



Write for Bulletin Mines 56 for data on the most complete line of Mine Jacks

TEMPLETON, KENLY & COMPANY

WORLD'S LARGEST MFGRS. OF INDUSTRIAL

MECHANICAL AND HYDRAULIC JACKS

2501 Gardner Road, Broadview, Illinois

SIMPLEX
JACKS

*here's
where
PAGE AUTOMATICS'
*Digging
Ability
pays
off....**

Underwater digging . . . where the operator can't see his bucket . . . is one place where the superior digging ability of a Page Automatic pays off in maximum yardage.

This 4½ cu. yd. Page Automatic is digging loose gravel, stone and clay at depths to 30 ft., and getting full rated loads every cycle. The automatic digging action built into every Page Automatic means that operators don't have to jockey the bucket to load it. The first pull on the loadline shifts the balance forward, concentrating a high



percentage of the bucket's weight on the tooth points to make it dig and fill in 1½ to 2 lengths.

Faster loading means more cycles and maximum production from your machine. To get digging ability—get a Page Automatic—the bucket that's guaranteed to outperform ordinary old style buckets under any digging conditions.

Write for Bucket Catalog GPB554 today.

PAGE ENGINEERING COMPANY
CLEARING P.O. — CHICAGO 38, ILLINOIS



Maximum loads are automatic with Page Automatics—the dragline bucket with digging ability built right in.

Page
Automatic Dragline
Buckets
Walking Draglines

If it's a PAGE... It DIGS

B-3109

Foreign News (Continued)

CEE at a demonstration before high ranking National Coal Board officials, the tunneling unit would drive an 18-ft diameter tunnel in hard rock at a rate of 200 yd a week. The unit's capacity was rated at 150 tph.

Prior to the demonstration National Coal Board officials told McGraw-Hill World News that they pin great hopes on the machine, since the NCB aims to meet a planned tunneling target of 200 mi annually during the next 15 yr.

The machine utilizes an 18-ft diameter counter-rotating disk head fitted with roller type cutting and bursting tools. Four identical motors of 160 hp each

power the machine, which is constructed from unit assemblies each weighing less than 3 tons. The unit assembly construction is designed to facilitate site location and re-location.

To provide reaction anchorage for the very high feed thrusts of the machine a system of radial hydraulic rams has been installed at the rear.

Other problems, such as dust suppression, cooling, tool life, and roof support, are nearing solution.

It is believed, too, that mucking will depend on buckets attached to the tunneling machine's disk head. The buckets will discharge on to an internal conveyor operating between the face and the machine's tail.

Last month's prototype was designed to cut in long, straight drives. A second machine will be capable of cutting curved and gradient tunnels.

WEST GERMANY

Coal Import Record

German coal imports from the United States reportedly have reached a record height, following World War II. In May, 1957 1.7 million tons were imported, 35% more than in April 1957 and 81% more than in May, 1956. Within the first 5 mo of 1957 Germany imported 5.7 million tons of coal from the United States, which is 64% of total German coal imports. Within the same period of 1955, 1.1 million tons were imported. In 1956, during the same period, 4 million tons.

POLAND

Poles To Boost Output

Poland's brown coal yield is expected to reach 40 million metric tons a year beginning in 1964. The amount represents an increase over current production of about 500%. The backbone of the expansion program is the strip mine Turov in Wroclaw, formerly the German Breslau district. The Turov mine will be enlarged and a second mine opened nearby. An east German engineering company is blueprinting the expansion and will deliver machinery. Germany still claims the mine area as German land.

BULGARIA

Wine and Women

Bulgaria's Communist press is complaining that the flow of wine and the flow of feminine gossip among women coal miners is slowing the flow of coal from the mines. The press, in fact, blames a current shortage of coal on what it calls "high jinks." One paper, commenting on the antics of female coal miners, says: "Too many women go down into the pits bringing bottles of liquor. Others bring bags of candy. Many others just lie down and go to sleep on the job. Sometimes they conduct a veritable ladies club meeting in the coal pit."

AUSTRIA

Uranium-Bearing Coal Ash

Austria's huge reserves of brown coal may be used to increase electric power and, at the same time, provide a supply of uranium as a source of nuclear energy. An analysis by government experts shows that there are 100 g, or a little over 3 oz of uranium in every ton of ash from the brown coal of the Zillingdorf coal field. The government plans, thus far, to construct a large electric generating station in the area of the coal field to help solve the growing problem of power shortages, then to treat the station's ash and recover the uranium.

For heavy hauling you'll do better with JEFFREY 8-wheel Trolley Locomotives

Big coal loads can be hauled fast with Jeffrey 27, 37 or 50-ton single-unit locomotives.

Operation and maintenance are better, too. The four-wheel, equalized double trucks and the short overhang at the ends give an easy ride at high speed. The eight wheels distribute the locomotive's weight for less concentrated rail loading.

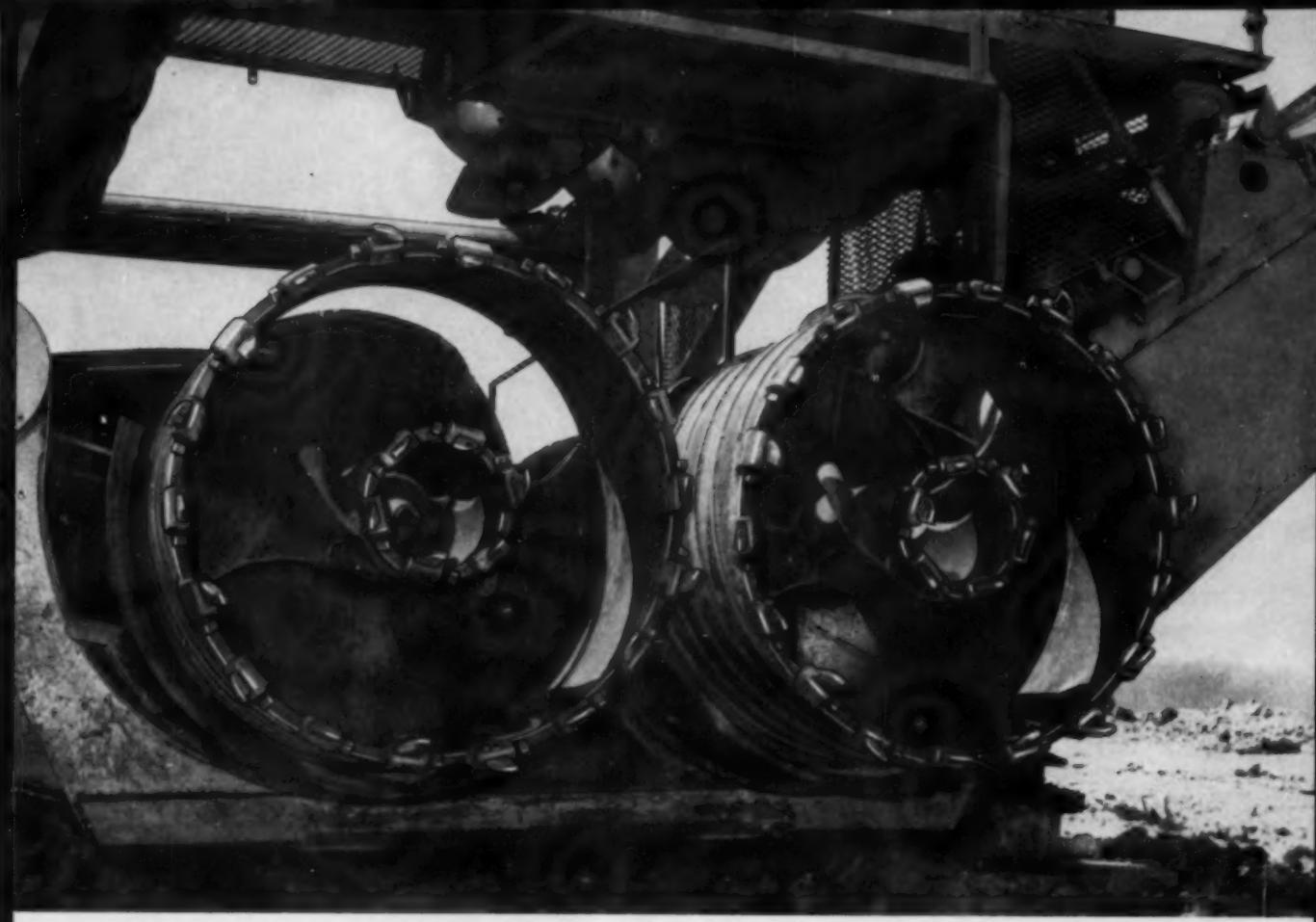
Outstanding operating and safety features include: roller-bearing type journal boxes and motor axle suspensions... air and dynamic service brakes... automatic couplers with air-operated uncoupling... trolley with air-operated retriever... separate blower for each motor.

Other features of 8-wheel locomotives and other types for mainline and secondary haulage are described in Catalog 836. For a copy, write to The Jeffrey Manufacturing Company, Columbus 16, Ohio.



JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING



**IT'S HERE...THE "Twin Head" AUGER FOR
THIN SEAMS...A NEW, EXCLUSIVE
Compton of Clarksburg FIRST**

FEATURES and SPECIFICATIONS

- Length: 29 feet
- Weight: 26 tons
- Augers: Carries 24—12½ ft. sections
- Power: 1—175 HP and 1—100 HP diesel engines
- Hydraulic Frame Jack Lift: 54 inch
- Auger Diameter: Two heads 24" to 32" each
- Drilling Depth: 150 feet
- Drills within 4 ¼" of the bottom for maximum recovery.
- Auger sections are racked conveniently on the frame.
- Elevating conveyor is integral part of machine.
- Hydraulic jack legs (with self-leveling pontoons) permit drilling up to 150 feet without misalignment.
- Double vertical overlapping holes can be drilled for greater recovery. Moves easily along working face of highwall.

Here's the new look in augers—the Compton "TWIN HEAD"—it makes thin seam mining feasible and profitable for the first time! Shoulder to shoulder the "TWIN HEAD" cuts, bores and spews forth high hourly tonnage from seams so thin they were once not suitable, nor profitable, for mining with the single headed coal augers.

Write, or call, to have a Compton sales engineer stop around and give you all the facts concerning the new "TWIN HEAD" or one of its "big brothers."

Compton, Inc.
INVENTORS OF COMPTON JUMP RECOVERY HEADS
CLARKSBURG, W. VA.



**WHEN LOOKING FOR AUGERS—
LOOK TO COMPTON**



Michigan Model 175A loads crushed stone into stationary hopper at end of 480-ft conveyor leading to concrete batch plant.

6,750 cu ft of concrete per hour, from automatic batching system fed by Michigan Tractor Shovels, paces Peter Kiewit paving crew

Peter Kiewit Sons' Company, Omaha, started construction of the new Minot (North Dakota) Air Force Base as originally planned for jet interceptors. But when the Air Force decided to base B-52-type heavy bombers there as well, a longer, wider, stronger runway became a sudden necessity. Modified plans doubled width to 300 ft, extended length well beyond the original 8100 ft. Key installation was a 50 ft ribbon of concrete, 16 inches deep, centered along the full length of the runway. To finish the greatly enlarged contract ahead of penalty date,

concrete pours had to average 2,000 cubic yards per 8-hour day.

Kiewit owns 16 Michigans, two used here

Faced with this tight schedule, the Kiewit crew turned to an automatic concrete batching plant and modern high-speed material feeding methods. According to R. D. Wilson, Kiewit Area Manager, the entire paving



operation was planned around the known productive ability of Michigan Tractor Shovels. Two of Kiewit's 16 Michigans, both big Model 175As, were brought in to feed the batching plant via mobile and stationary hoppers and automatic conveyors. Handling 3,200 tons of aggregate per day, these 2 3/4 yard Michigans had to deliver heaped buckets every time—and they did! Their big loads, delivered fast, kept plant at peak production of 180 batches (each 37.4 cu ft) per hour, day after day . . . making the job possible—and profitable!

Michigans eliminate pulverizing problem

One of the major advantages of the Michigans was that, despite their speed, the big low-pressure tires compacted—but never pulverized—the stone underfoot. Thus Kiewit eliminated a major problem—the crushing and grinding of aggregates often experienced when crawlers are used. Trucks delivering the stone dumped at the edge of the air field; there the Michigans took over. These fast, highly-maneuverable units loaded the material, carried it up steep ramps to build and maintain huge stockpiles.

"Fast, dependable, easy to repair"

"Another reason we put Michigans on the job was we knew they require very little maintenance," says Paving Supt Max Woodard. "When repairs are necessary, excellent accessibility makes it an easy job. We've also found these machines have enough power to do anything we want. They're fast, too. Our operators like the way they handle. We like the way they kept those hoppers full. Fuel? One tank of diesel oil (50 gallons) keeps them going all day long! That torque converter's good and the power-shift transmission is a big improvement over other machines. Michigans have done a nice job for us."

Make this test

Chances are, Michigans can do a "nice job" for you, too, no matter what bulk materials you have to move. But there's an easy way to find out first hand! Simply ask your Michigan Distributor for a free demonstration—no obligation, of course. If what you see looks good enough to buy—and we think it will—your distributor has a wide range of purchase plans . . . including Clark's popular Lease-Purchase which lets you put one or more Michigans to work without spending a cent of capital.

Normal carry position, slightly above ground level, eliminates possibility of stone-crushing dozing action; yet permits high-speed travel without spillage-loss.



Clean design of bucket mechanism gives operator excellent visibility when dumping into hopper.



Another of Peter Kiewit's Michigans serves as all-around handyman on company's Indiana Turnpike contract. This 102 hp 2 yd Model 125A lifts up to 11,000 lbs, carries 5,500 lbs at 4 mph.

Michigan is a registered trade-mark of
CLARK EQUIPMENT COMPANY
Construction Machinery Division
2473 Pipestone Road,
Benton Harbor 43, Michigan
In Canada: Canadian Clark, Ltd.
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CLARK
EQUIPMENT



MORNING SESSION—R. R. Cope (left), Aluminum Company of America; Steve Bunish, Anaconda Wire & Cable Co.; George Reynolds, U. S. Gypsum Co.; Howard Nunn, Ken Coal Co., association president; and C. W. Desgrey, U. S. Gypsum Co., session chairman.



AFTERNOON SESSION—Dr. T. A. Read, University of Illinois, session chairman; G. H. Gunnoe, General Electric Co.; and Prof. F. D. Wright.

Portable cables, ground-fault protection and commutation problems major topics as...

Open Pit Association Holds 13th Annual Meeting

NEW USES for aluminum, portable cables for surface mining, ground-fault protection, causes and remedies of commutation trouble and mining research were topics at the one-day meeting of the Electrical Division of the Open Pit Association's 13th annual meeting at Urbana, Ill., June 20.

More than 160 electrical engineers and chief electricians gathered in the University of Illinois' Gregory Hall to participate in the technical sessions. The group was welcomed on behalf of the University by Frederick Wall, dean, graduate college. Howard Nunn, association president, extended welcoming remarks on behalf of the electrical group.

A record 220 members, wives and friends attended the annual banquet on Thursday evening. "Fire Magic" was the topic of the talk at the banquet by Dr. Llewellyn Heard, Standard Oil Co.

Officers for the coming year were elected as follows:

President—**Robert T. Taylor**, electrical engineer, Peabody Coal Co., St. Louis, Mo.

Vice President—**David Flota**, electrical engineer, Sahara Coal Co., Harrisburg, Ill.

Secretary-Treasurer—**L. E. Briscoe**, electrical engineer, Ayrshire Collieries Corp., Indianapolis, Ind., reelected.

At the morning session, speakers and their subjects were R. R. Cope, head, electrical division, Aluminum Company of America, "Designing with Aluminum"; Steve Bunish, engineer, Anaconda Wire & Cable Co., "Portable Cables for Surface Mining"; and George Reynolds, electrical engineer, U. S. Gypsum Co., "AC Ground Fault 480 Volt Protective System." C. W. Desgrey, vice president, U. S. Gypsum Co., presided.

DESIGNING WITH ALUMINUM

Aluminum alloys often are indiscriminately referred to simply as alloys, Mr. Cope said. There are many different aluminum alloys and a four-digit number system has been developed to aid in identifying alloys. The numbers indicate the chief component of the ingredients, the impurity limit and the specific composition. Non heat treatable alloys are available with tensile strengths ranging from 4,000 to 41,000 psi. Heat treatable alloys are available in tensile strengths varying from 8,000 to 76,000 psi.

Among the economic advantages of aluminum cited by Mr. Cope were light-weight, resistance to corrosion, high electric conductivity, high heat conductivity, non sparking, non magnetic, non toxic, high strength in alloy, good appearance, scrap value and low price. On the subject of corrosion, Mr. Cope said aluminum alloys are resistant. Alloys resist the action of chemical compounds like hydrogen sulphide, carbon dioxide and dust. The oxide film which prevents corrosion also is a problem in joining aluminum.

There are five methods whereby aluminum can be joined, Mr. Cope continued. These are the inert-gas process; ultrasonic; pressure welding; brazing; and hard soldering. In addition it can be joined mechanically by crimping or clamping.

The inert-gas process, using helium or argon, requires no flux and joints are highly resistant to corrosion. The ultrasonic method, new in the last 2 or 3 yr is similar to spot welding and is a lap joint. A pressure of 200 lb is applied at 20 kilocycles. No heat, flux or pre-cleaning is needed.

Pressure welding is used to make a

lap or butt joint of two surfaces cleaned by scratch brushing. Two problems with this method are a thinner resulting cross section and poor bending qualities. When aluminum is joined by brazing there is no melting of the parent metal, but the temperature must be watched carefully. It is not recommended for a multi-strand conductor because of the corrosive effect of the flux. Hard soldering is done at a lower temperature, using a high-zinc solder with a zinc-chloride-type flux, Mr. Cope explained.

PORABLE CABLES

Progress in shovel design has been paralleled by improvements in cables, Mr. Bunish said. In the '30's emphasis was placed on developing better portable cables and in the '40's synthetic rubber came into use. Research continues today. Cables are getting larger and carrying higher voltages. Temperature ratings have increased, jackets are tougher and refinements have been made in manufacturing processes.

The characteristics of a good portable cable are that it is adequate in size, flexible and safe to handle. It is physically tough and resistant to weathering and chemical action. A cable has its limitations and when they are exceeded damage results. Damage to the conductors, insulation or the protective sheath may cause a failure, Mr. Bunish added.

In describing results of research in the causes of cable failure, Mr. Bunish said there is a wide diversity of operating voltages. These range from 440 to 7,200 v and most exceed 2,000 v. Type W cable is used for voltages under 2,000 and type SHD for higher voltages.

Two questions were asked companies



IDEA FORUM—Seated: L. A. Selleg (left), Westinghouse Electric Corp.; Leslie Curry, Ayrshire Collieries Corp.; Howard Nunn, Ken Coal Co.; R. T. Taylor, Peabody Coal Co.; and Charles Bledsoe, Stonefort Corp. Standing: J. C. Rettenmayer, United Electric Cos.; George Reynolds, United States Gypsum Co.; and Edmund Groat, General Electric Co.

in gathering information on railing cables: What are the unusual conditions that would affect cables? What causes cable damage or failure? Results of the study showed that the causes of cable trouble were the same at all operations. Location and type of mining conditions played an important part, Mr. Bunish said.

Some of the specific causes of cable trouble include excessive traffic, round-the-clock operation, long moves up and down the highwall, slides, failure to move the cable before blasting, extreme heat or cold, continual moving through uncleared areas, operating in water or ice, and moving cables with trucks or tractors.

Mr. Bunish said failures according to frequency were as follows:

Falls and slides	27.2%
Run over by vehicle	22.7%
Dragging while moving	12.1%
Splice and previous damage	7.5%
Excessive tension	6.0%
Severe bending	4.5%
Cable design	3.0%
Miscellaneous	17.0%

To eliminate the most common causes of cable damage, Mr. Bunish suggested that cables be moved to a safe position during blasting; that they be placed in a position where there is the least chance of being run over; and that good lighting be provided at night.

GROUND-FAULT PROTECTION

There are three basic types of 480-v current-limiting resistance-grounded fault protective systems based on the principle employed for the 2,400- and 4,160-v systems. Mr. Reynolds said he hoped enough interest would be created among operators and manufacturers so that the three 480-v systems could be resolved into one system using one type of equipment.

The objectives of equipment grounding are twofold, Mr. Reynolds added:

1. To limit the potential between non-

current carrying equipment frames and parts of the plant between them and the earth to a safe value.

2. To provide a low-resistance return path to the transformer neutral to eliminate the dangerous potential difference to which personnel could be exposed and to facilitate tripping of the faulted circuit.

The objectives of the ground-fault protective system are to:

1. Protect personnel from exposure to dangerous voltages to ground by limiting the voltage to ground to a safe value.

2. Protect insulated electrical equipment from severe damage at the time of a failure of insulation by limiting the current flow through the damaged spot and removing the equipment as quickly as possible from the power source.

3. Isolate the faulted portion of the system instantly at time of fault without disturbing the balance of the system and thus limiting the outage time to the one faulted section.

4. Limit the possibility of a second and simultaneous ground fault occurring in another section of the operation. This might possibly create dangerously excessive voltages on the entire system and cause loss of life and damage to much equipment.

5. Reduction of hazard of electrical power-cable fires and at times loss of a shovel or other equipment because of fire. A high-resistant fault may cause just enough current to flow to cause excessive heat but not enough to trip the overload breakers.

The grounding of portable mining machines can be a hazard instead of a safeguard if the fault protective equipment is not properly installed and maintained, Mr. Reynolds warned. The following precautions should be taken in operating and maintaining a ground-fault protective system:

1. The protective system should be checked periodically for positive operation.

2. The ground wire should always be the first lead connected whenever a power cable is reconnected to the system. And it should be the last to be disconnected when removing a cable from the circuit.

3. All ground-wire connections should be carefully checked for good connection each time a cable is changed.

4. Ground wires carried in portable cables should be checked regularly for continuity.

5. Ground network should be checked periodically under various conditions to assure a continuing low resistance which is essential for proper operation of the system.

6. Faulty portable power cables should be permanently repaired with vulcanized splices as soon as possible.

Speakers and their topics at the afternoon session included G. H. Gunnoe, senior application engineer, Carbon Product Sales, General Electric Co., "Commutation Trouble, the Causes and Suggested Remedies"; Prof. Fred D. Wright, mining and metallurgical engineering, University of Illinois, "Mining Research at the University of Illinois." The afternoon program was concluded with a forum of useful ideas presented by members of the program committee.

COMMUTATION TROUBLE

Commutation is a reversal of current in and out of the brush. This must be done without damage to the equipment, Mr. Gunnoe said. Some of the common commutation troubles are sparking, brush wear and commutator wear.

Using a large assortment of color slides, Mr. Gunnoe discussed the various troubles in commutation and how they can be overcome. Chatter breaks brushes, terminals or hardware and is the result of frictional characteristics between brush and the commutator. Mechanical vibration frequently causes shear breakage of the brush. The remedy for this is to smooth the commutator. Loose parts

(Continued on p 150)



SEE THIS CABLE...BEND IT...

PORTABLE MINING CABLES
HAVE TO BE ABLE TO TAKE IT...
AND THEY CAN IF THEY'RE
ROEBLING ROEPRENE
PARALLEL TWIN MINING CABLES

There are many reasons why. The Roeprene sheath, for instance—and the way this tough

sheath locks conductors firmly in place. And the unique Roebling grounding conductor that is braided of fine annealed copper wire, then *eased* into its flat shape. Result—no broken or crushed wires to cause problems later.

Then, too, there's the heat- and moisture-resisting rubber insulation around each power conductor...and the over-all combination of properties (including finer, more pliable wire in the power conductors) which



USE IT...TEST IT!

makes this *full-power* cable extra flexible. See this cable—bend it—use it—test it! You'll know why it's the most economical cable you can buy!

For more information, write the Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation



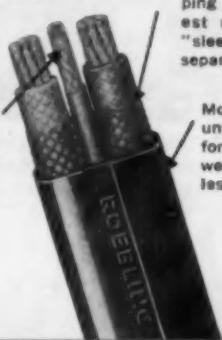
Approved by Pennsylvania Bureau of Mines, Approval P-111, and complies with requirements of U. S. Bureau of Mines for flame resistance.

Ground conductor is braided from annealed copper wire—has braided green cotton covering that strips easily for splicing, terminating. Parallel Twin Cables Type W (without ground) are also made by Roebling.

Roeprene Parallel Twin Mining Cable is extremely flexible and always reels flat. Try it. See how easily it handles, how well it stands abrasive conditions like these—and worse. Tough Roeprene Sheath resists oil, moisture, retards flame, too.

Each insulated power conductor is braided with seine twine, giving sheath greater contact and gripping area. Even in severest use, cable resists "sleev ing," and internal separation.

Mold curing gives cable uniform, smooth surface for easier handling, longer wear. These cables cost less in the long run!





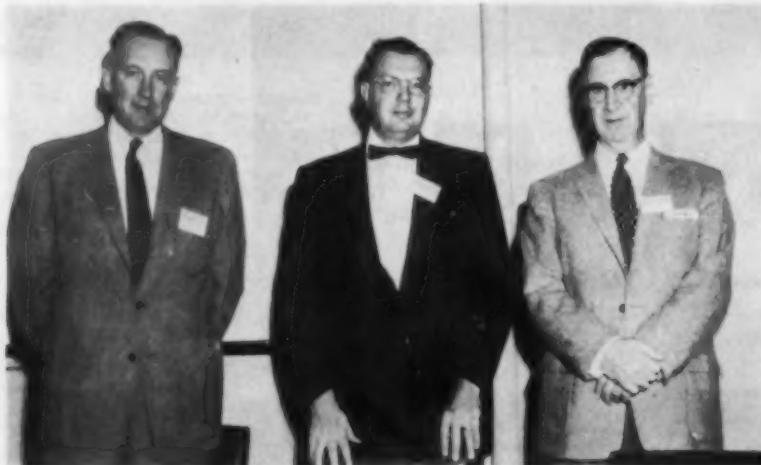
HIGH AND LOW MINING, LABOR RELATIONS, STEAM AND COKING COAL, WESTERN STEEL OUTLOOK—
Lyman Fearn (left), chief mine inspector for Wyoming, presiding; L. A. Engstrom, Kemmerer Coal Co.; Don Newberry, Independent Coal & Coke Co.; L. W. Ingles, Colorado Fuel & Iron Corp.; Edward G. Fox, Bituminous Coal Operators' Association; William K. Dennison Jr., Kaiser Steel Corp.; Max C. Scheble, Columbia-Geneva Steel Div.

Mining and Marketing

Deep mining, strip mining, market possibilities and development, and utilization research covered at 53rd regular meeting of the Rocky Mountain Coal Mining Institute.

MARKET PROSPECTS in the Rocky Mountain area shared the stage with mining methods and equipment at the 53rd regular meeting of the Rocky Mountain Coal Mining Institute, Glenwood Springs, Colo., June 23-26. The institute elected

R. M. von Storch, general superintendent, coal mines and quarries, Columbia-Geneva Steel Div., United States Steel Corp., Columbia, Utah, president for the coming year, succeeding John Peperakis, manager, Sunnyside (Utah) operations,



MARKET DEVELOPMENT—R. M. von Storch (left), Columbia-Geneva Steel Div., program chairman, presiding officer and new institute president; Carroll F. Hardy, Bituminous Coal Institute; Robert L. Hair, CF&I Corp.

Kaiser Steel Co. E. S. O'Connor, Book Cliffs Coal Co., Salt Lake City, was toastmaster at the institute banquet, and in its final business session the membership approved a resolution asking the help of western Senators and Congressmen in having legislation modified to facilitate the development of coal on public lands.

COAL PROMOTION

The engineering approach to the promotion of coal sales was the theme of the opening session, presided over by Mr. von Storch, who was introduced by Past President Robert L. Hair, general superintendent, coal mines, Colorado Fuel & Iron Corp., Pueblo, Colo. Noting that coal, by reducing production cost and remaining competitive, had been able to recover from the two "major disasters" of loss of the railroad market and the onset of natural gas, Carroll F. Hardy, managing director, Bituminous Coal Institute, outlined the background of BCI, its aims, and how it is going about achieving them.

One favorable factor for coal is the rise in the prices of oil and natural gas, while coal prices have remained stable. However, this and a rosy outlook for the future are not indications that coal can expect to pick up business automatically. "There is still a long hard fight ahead to beat the competition from other fuels, and this must be done on an engineering basis." BCI was formed in October, 1956, to meet competition from other fuels on just such a basis.

BCI's objective is consumer service, with primary emphasis on engineering, "to improve coal's competitive position in the heating and steam-generation markets as supplied by the retailers, distributors and producers, and served by rail, truck and water delivery." The in-



COAL OUTLOOK, CONTINUOUS MINING, GROUND PROTECTION—R. R. Williams Jr. (left), session chairmen; Thomas Allen, chief coal mine inspector for Colorado; R. M. von Storch, Columbia-Geneva Steel Div.; John S. Wright, U. S. Borax & Chemical Corp.; A. Z. Dimitroff, USBM.

Rocky Mountain Officers

President—R. M. von Storch, general superintendent, coal mines and quarries, Columbia-Geneva Steel Div., U. S. Steel Corp., Columbia, Utah.

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Secretary-Treasurer—Fred W. Whiteside.

Executive Board—Colorado—R. R. Williams Jr., Colorado Fuel & Iron Corp.; Andrew Allen, Thompson Creek Coal & Coke Co.; Utah—Ray Woodward, Spring Canyon Coal Co.; M. Vern Woodhead, Independent Coal & Coke Co.; Montana—J. W. Fisher, Roundup Coal Mining Co.; Wyoming—W. M. Hunter, deputy inspector; L. A. Engstrom, Kemmerer Coal Co.; New Mexico—John Garcia, chief mine inspector; W. K. Dennison Jr., Kaiser Steel Corp.

Rocky Mountain Institute Themes

dustrial-commercial market, now taking nearly a third of the commercial tonnage, is the prime target.

BCI is proceeding by compiling data on the market possibilities, including the strength of competition; by the establishment of a permanent field staff in 14 districts covering the United States; and by the establishment of district advisory committees to assist the regional managers. (For a complete description of the BCI program, see *Coal Age*, January, 1957, p 54).

The big need now, said Mr. Hardy, is more industry participation. "BCI is under way but it needs your cooperation, your ideas, your advice, your criticism. BCI offers an opportunity for everyone interested in expanding the use of coal. Not only can this program be of material aid in the expansion of the industrial-consumer market, it also can elevate the coal industry to a more-comparable basis with other industries."

Natural gas, which got its start 25 yr or so ago, is the biggest problem of the Colorado industry, said Oren F. Bridwell, secretary, Northern Colorado Coals, Inc., in discussion. When its price advantage disappears, coal will automatically move back into the heavy industrial market. Small industrial and commercial users, however, present a more-difficult problem, and consequently BCI help is especially welcomed. The Colorado Coal Committee working with BCI has as its major objective making sure that no industrial or commercial users convert without having heard coal's story.

COAL PROBLEMS

"Fourscore years ago, more or less, there came into existence a new order of human beings who began a new industry

which changed the United States from a country depending mostly on agriculture for its natural economy to a beginning of industrial activity which, as years went on, has made this Nation the acknowledged leader in world affairs. This new order of human beings were the coal miners and coal operators who started producing coal in quantities never dreamed of as possible." Thus Thomas Allen, Colorado State coal-mine inspector introduced a discussion of coal's status today at the second technical session, presided over by Robert R. Williams Jr., manager of mines, The Colorado Fuel & Iron Corp., Pueblo, Colo.

But in spite of its undeniable contributions coal still has to battle discrimination of a variety of types. Examples include unfavorable reports in the press, public antipathy to coal development in new areas, practically no government assistance in comparison with other industries, excessive taxation by both federal and local governments, safety regulations more comprehensive than in practically any other industry, government preference for hydro power and aid to oil and gas, and failure to check imports of both oil and gas.

"It is established that in the Rocky Mountain area there is enough coal to last for at least 1,000 yr for all purposes—gas, oil, electricity and other uses. Yet no attempt is being made to get these reserves into action. A supposed economy move in the Congress of the United States resulted in stopping practically all coal research and investigation. Is this a wise move in face of the fact that coal can meet all demands for centuries to come, while liquid and gaseous fuels cannot last one-half century?

"Therefore, a few concluding remarks

on conditions in the Western States. The Colorado, Wyoming and Montana coal industries are two-thirds dead. New Mexico is completely dead. There only remains Utah, but the coal industry in that state faces extinction in the near future when natural gas from other states gets into the fuel market and the pipe lines from Canada start feeding to the Pacific Northwest. . . .

"It is to be hoped, therefore, that someone or some group will soon wake up and realize the importance of the solid-fuel industry in this country and develop without delay some better-balanced programs for using our natural resources in energy."

CONTINUOUS MINING

"It has definitely been determined that mining with ripping and boring miners can be successfully carried out in pitching seams of 20%, insofar as the problems arising from these grades are concerned," said Mr. von Storch in describing continuous mining at the Geneva and Columbia mines in the Lower Sunnyside seam 7 to 16 ft thick under 300 to 2,900 ft of cover and dipping 12½ to 20%. "The continuous miners," he added, "even when working under the most-adverse conditions, will produce coal more economically than conventional equipment working in normal conditions."

A ripper-type miner was installed at Geneva in November, 1955, and a boring-type unit went into service at Columbia in April, 1956. The ripper unit was first used in development-bench mining in 14 ft with roof-bolting on the advance, leaving 4 ft of bottom coal. Bad top and very hard coal reduced efficiency and resulted in a change to retreat mining room-and-pillar mining the en-

tire 14-ft seam. Rooms are driven on the strike and pillar pockets are made up the 12½% pitch. After the miner takes out the lower 10 ft the top 4 ft usually falls. Results in this work have been good.

The boring unit also was started in strike development where the pitch is 20%, and also has been used in pillar recovery. To solve certain problems, a hydraulic drill was added to the equipment to determine the depth of the bottom coal and thus locate the machine in the seam. Clinometers were added to both the crawlers and the head to keep the machine on grade. Pusher-plate improvements eliminated packing of coal under the tracks, thus raising the machine and causing binding. Grousers were added to the tracks to prevent either backward or sideways slippage.

Potash mining with continuous miners and extensible belts in the Carlsbad area of New Mexico was presented pictorially by John S. Wright, Superintendent, United States Borax & Chemical Corp. The fact that four properties in the area are using such equipment indicated a definite trend, Mr. Wright observed. At his property, it has been found that better results are attained when maintenance is done on the dayshift. In one panel where four miners are operating, the foreman has available a mechanical crew equipped with battery cars for equipment and repair materials, a portable welding unit and a diesel haulage unit for moving transformers. Old shuttle cars fitted with batteries are used for moving conveyors.

EQUIVALENT GROUNDING

The theory and use of alternatives for separate frame-grounding conductors—equivalent grounding devices—was discussed by A. Z. Dimitroff, mining health and safety engineer (electrical), U. S. Bureau of Mines, Denver. Fairly low voltages can result in electrocution, he noted, in citing findings that the maximum safe for a man is just a little less than that which will cause him to freeze to a circuit, i.e.; 21 v AC, 60 cycles, hand-to-hand contact, and 104 v DC. Current values up to 8 milliamp are considered safe for the average person but there are exceptions.

Manufacturers have had two aims in developing equivalent grounding devices: (1) eliminating the frame-grounding conductor from trailing cables and (2) providing protection against shock hazard by taking power off the machine when a ground fault occurs. The first aim is achieved by mounting the device on the machine; the second by keeping frame potential and tripping-current requirements to a minimum 40 v between frame and ground or a 40-milliamp current. "Limiting of the ground-fault currents also provides excellent machine protection."

Since the devices are mounted on the machines and operate on the machine contactors, only the circuits on the load side of the contactors can be de-energized. Consequently, protection from shock and machine damage is only partial, and the frame can remain energized even though the machine is rendered



NCA PROGRAM—J. S. Besser (left), Colorado Fuel & Iron Corp.; L. Newton Thomas, president, National Coal Association; and Oren F. Bridwell, Northern Colorado Coals, Inc., session chairman.

inoperative. Though the protection is only partial, it still includes the majority of ground faults. However, this situation "only emphasizes the desirability of ground-fault protection at power-supply points rather than at the contactors of individual machines. . . .

"With development of equivalent grounding protection and possible improvement and development in the near future of grounding devices which will provide virtually full coverage against electric shock and damage to equipment, it is hoped that safety records will be improved even more."

Answering a series of questions relayed by W. C. Painter, Joy Mfg. Co., Price, Utah, Mr. Dimitroff noted that one new device employing a high-frequency signal will cut the power at the nip station rather than at the machine, while another suggested unit will do the same but will require a wire. On the question of reinstating the permissibility of a traded machine, the manufacturer can inspect and apply the plate when the machine is restored to original condition. However, if the machine is modified, only the Bureau can grant the plate.

If changes in permissible units are contemplated, it is not necessary to notify the Bureau in advance but it is advisable to make sure that the changes will be acceptable. Also, a nonpermissible machine may be used in a mine on an experimental basis provided permission is obtained.

HIGH-COAL-AND LOW

The story of underground mining with loaders, shuttle cars and belts in as low as 42 in of coal, and of open-cut mining with scrapers, shovels, draglines and other stripping equipment in coal averaging 90 ft was presented in slide form by L. A. Engstrom, chief engineer, Kem-

merer Coal Co., Kemmerer, Wyo., representing Mike Zakotnik Jr., general superintendent, to open the third technical session under the chairmanship of Lyman Farn, head of the Wyoming inspection department.

The underground operation is the Rainbow No. 6 mine of the Gunn-Quealy Coal Co., near Rock Springs, Wyo., recovering the No. 7 seam from openings in the last cut from the initial stripping. The stripping operation is the Elkay mine near Kemmerer, where the Adaville No. 1 coal sometimes reaches 110 ft in thickness. Overburden and coal are benched.

LABOR RELATIONS

Why the Bituminous Coal Operators' Association was formed, how it functions, and what it is achieving were discussed by Edward G. Fox, BCOA president, of Washington, D. C. Mr. Fox was specially introduced by Mr. von Storch.

The failure of public bargaining, which normally resulted in the taking of stands from which neither side could retreat voluntarily, and which made outside intervention, with all of its adverse effects, inevitable, was the reason for the formation of BCOA in 1950. Its principles were essentially the following:

1. Elimination of strikes and stoppages, which are economically wasteful and could be ruinous to both the industry and its employees.

2. Conduct of dealings with the union without, as far as possible, and bearing in mind the interest and well-being of the public, having the government and self-appointed public spokesmen as parties.

3. Businesslike relations with the union in an attempt to solve mutual problems to the best advantage of each.

The articles of association of the BCOA state the purpose to be the establishment of stable, just and harmonious



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ALLIS-CHALMERS

Engineering in Action



MANUFACTURERS' HOUR—T. A. Hobing (left), Westinghouse Electric Corp.; C. B. Peck, Anaconda Wire & Cable Co.; Frank T. Saunders, Bethlehem Pacific Coast Steel Corp.; J. Wiley Bischoff, Texas Co.; Kenneth J. McLeod, Socony Mobil Oil Co.; D. F. McElhatten, Mine Safety Appliances Co.; Duane Saxman, Kennametal, Inc.; C. W. Brown, Atlas Powder Co. (not shown).

relations. What we did in 1950 was essentially substituting democratic intra-industry conferences for the first and fruitless steps of the old joint wage conferences and start right in with real collective bargaining between Mr. Lewis and a representative of the bargaining agency. . . . When discussions and negotiations have reached a point where it is felt no further bargaining is possible, the matter is then submitted to representative groups for discussion and ratification. Fanfare is reduced to a minimum, and these meetings are held with as little publicity as possible—almost to the point of secrecy."

This results, Mr. Fox noted, in many operators being confronted with the necessity of increasing wages without any prior knowledge. "But please remember—the alternative is the chaos of the 30's and 40's. . . .

"It might be appropriate at this point to pause and ask ourselves: 'Has this method of wage negotiation been to the best advantage of the bituminous industry and, if so, have not these advantages been bought at a high cost?' It is difficult to place an exact dollar value on 7½ yr of peace in the industry." But some of the benefits are:

1. Greater stability has resulted in keeping old customers and winning new ones because of assured continuity of supply.

2. Direct shutdown costs have been avoided.

3. High as they have been, the wage increases since 1950 have not been out of line with those in other industries.

4. "Among the major results of the 'new look' are the open-end contracts and the real collective bargaining that has gone into their making." It reduces the incentive to strike and provides a climate for real bargaining.

5. "And lastly we have shown that collective bargaining without government interference can work and work well. . . .

"A further characteristic of our new relationship is the establishment of an industry organization that has made possible swift and effective handling of problems on an authoritative basis that has resulted in greater cooperation and understanding. Contract disturbances that attain more than local proportions are given prompt attention and matters of joint interest in governmental action have received the full support of the UMWA.

"The mine workers have accepted the responsibilities that properly fall upon them because they have achieved a high level of wage and social benefits. They have joined us without reservation in all our efforts to combat the influence of competitive fuels, government interference and unreasonable safety regulations, and have aided us in promotion of greater markets for our product."

In answering a number of questions read by James D. Reilly, executive vice president, Hanna Coal Co., Mr. Fox noted that the present vacation pay and schedule was a compromise. The payment finally agreed on was under that originally requested and is now at a rate of \$180 a year. A longer vacation was desired, and came as a shock to the steel company mines particularly. After consideration, a counter-offer to extend the vacation period by giving days at the end of the year when production would be less affected was made, with an extra \$40 a year as an incentive, and accepted.

Where disagreements over safety matters occur, their handling depends upon whether they involve law or the safety code. Where law is involved the operator must appeal to the U. S. Bureau of Mines. Where the code is involved, the appeal goes to Joint Industry Safety Committee. Since 1954, the board has received 113 appeals, has denied nine and has granted the others. This reflects the fact that operators have refrained from appealing unless they had solid

reason for doing so, plus harmony in handling down decisions.

Legislation to regulate welfare funds can be expected, but it probably will not be too stringent, Mr. Fox declared. One of the problems for industry is the fact that about 90% of them are administered by employers.

STEAM-PLANT COAL

What electric power expansion means to coal was the subject of a discussion by W. J. O'Connor, president, Independent Coal & Coke Co., Salt Lake City. Mr. O'Connor's paper was read in his absence by Don Newberry, superintendent of the Castle Gate (Utah) operation of Independent Coal & Coke.

Growing power requirements, reflecting growing steel production and development of the uranium industry resulted in the establishment of a new power station at Castle Gate. Castle Gate mine received a contract to supply two-thirds of the coal. Capacity of the initial unit was 66,000 kw. A new 100,000-kw addition will go into operation by Sept. 1, 1957, and will require 300,000 tons more coal per year, bringing the Independent Coal & Coke delivery rate up to 400,000.

It is now estimated that the power company will have to double capacity every 7 yr. "This means more mine-to-plant units to avoid high and ever-increasing freight rates." But the higher realization for domestic coal still is needed to assure at least a small profit.

"The only expanding market for coal that we can see at this moment is the sale of power coal. The domestic coal business, as well as railroad and industrial markets, have been taken by gas and oil until the commercial coal industry in Wyoming, Utah, Montana and Colorado is in a deplorable condition.

"Power companies naturally buy the cheapest fuel, and as long as the gas pipeline companies are permitted to



All Buckets Take a Beating...Here's the Medicine!

We're often asked about bucket maintenance, what hard-facing material to use and how to use it for maximum wear protection. Actually, your own equipment gives you part of the answer. Each bucket wears differently, depending upon how it is used and the kind of material handled. By watching for development of wear patterns, then hard-facing these areas at definite intervals, you'll get extended service with greatest economy. Remember, a frequent touch-up is better than a major repair...more economical in hard-metal and less costly in down time.

If buckets are severely worn, first build up with Stooody Manganese. For hard-facing, the alloy most commonly used is Stooody 21, preferred because of good wear resistance, fast deposition rate and low price. Occasionally, under conditions of excessive abrasion, Coated Tube Stoodite gives longer life on shovel teeth and reduces maintenance costs.

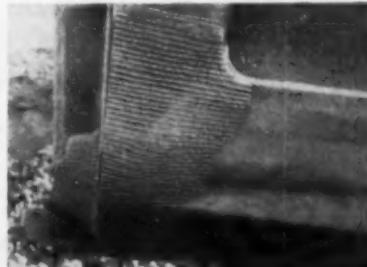
Full particulars on alloy recommendations and hard-facing procedures are in the Stooody HARD-FACING GUIDEBOOK. Ask your dealer for a copy (check the "yellow pages" of your phone book) or write direct.



Bucket teeth (top illustration) and adapters (above) are amply coated with Stooody 21. Hard-faced teeth on this job averaged two full shifts of extra service before needing additional hard-facing treatment.



Lips on this clam shell are kept in good shape for a tight seal with Stooody 21.



These Stooody 21 beads across the bucket resist severe abrasion as it is dragged across rubble, returning for a new bite.



Scoop lifts often lead a tough life. Here, lips, sides and bottoms are kept in good condition with Stooody 21. Occasional touch-ups are made as wear occurs.

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Rocky Mtn. Institute (Continued)

dump large quantities of gas (some of it imported from Canada) at fantastically low prices, the coal companies do not have a chance to compete unless they have a substantial advantage in freight savings by having power plants located at their tipplers."

COOKING COAL

Mining and processing of coking coal at the Allen mine of the Colorado Fuel & Iron Corp., Weston, Colo., was detailed by L. W. Ingles, superintendent. Using two portals the mine is presently producing on two shifts, with the third for maintenance, major rockdusting and distribution of supplies. Daily output is now a little over 4,000 tons, and could be raised to 6,000 tons by going to a third shift or adding more equipment on the present shifts.

Mobile sections are operated with a loading machine, universal cutter, two shuttle cars, a hand-held drill and pneumatic stoppers for roof bolting. High recovery is the aim to conserve the available reserve of coking coal. Panel belts receive coal from the shuttle cars—or shaking conveyors in one pitching area—and discharge to mine cars. The cars are hoisted up the slope at one portal, and are dumped underground at the foot of a slope belt at the other portal.

Safety is a major consideration at Allen mine. In the first 5 mo of 1957, the frequency was 12.22 and the severity 0.284. At the Frederick mine of the company, the frequency was 4.33 and the severity 0.138.

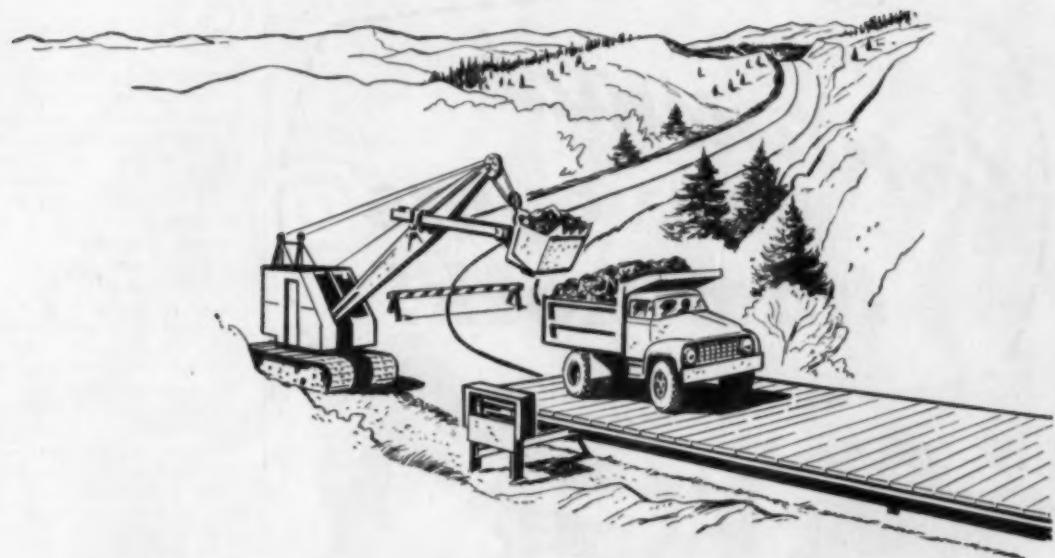
An expected 4- to 6-million-ton increase in the use of steel in the western states in the next 10 yr is reflected in a \$194 million expansion program at the Fontana (Calif.) plant of the Kaiser Steel Corp. As a result the company will need to step up its requirements for coal from its Koehler mine in New Mexico by 60%, observed William K. Dennison Jr., mining engineer and superintendent, with headquarters at Raton, N. M.

Exploration to determine reserves and locate good metallurgical-grade coal is one phase of the program. Another is rehabilitation and modernization of Koehler mine, both underground and on the surface. About 7 mi of main haulage is being renovated, including widening with 4JCM miners along the right rib, with an 8-BU for loading into mine cars. The haulway will be laid with 90-lb rail and 15-ton cars will replace 2½-tonners. All face equipment will be AC and four working sections will be equipped with 6CM miners, 11-BU loaders, two 10SC shuttle cars and a roof bolter each.

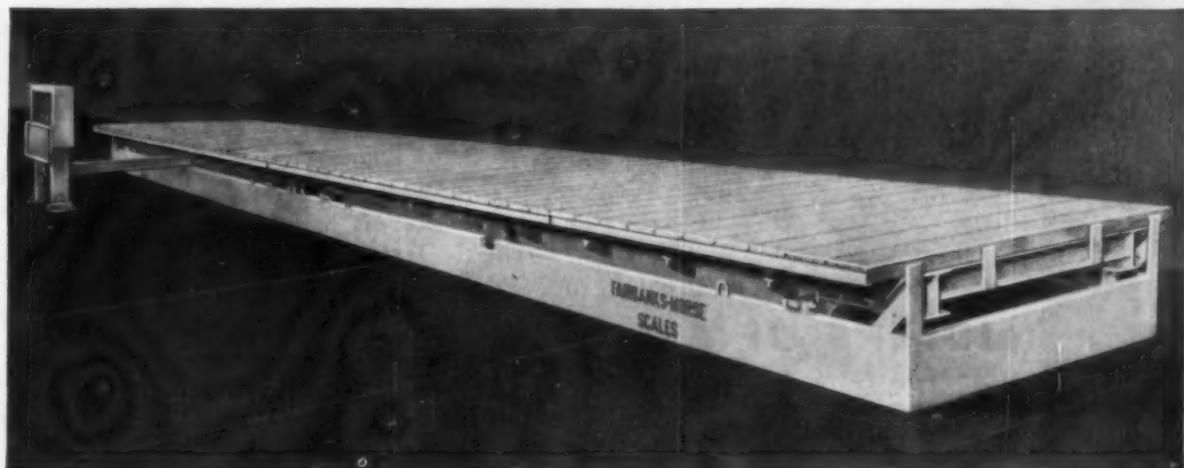
On the surface a new outside haul and rotary dump will be constructed, and the present washer will be moved to the dump site. Capacity will be raised from 175 to 250 tph, and flotation eventually will be added for 48x250M coal per day, 75% recovery.

STEEL IN THE WEST

Capacity of facilities for the production of ingots and steel castings in the eleven western states was 2,017,000 net tons in 1938, said Max C. Scheble,



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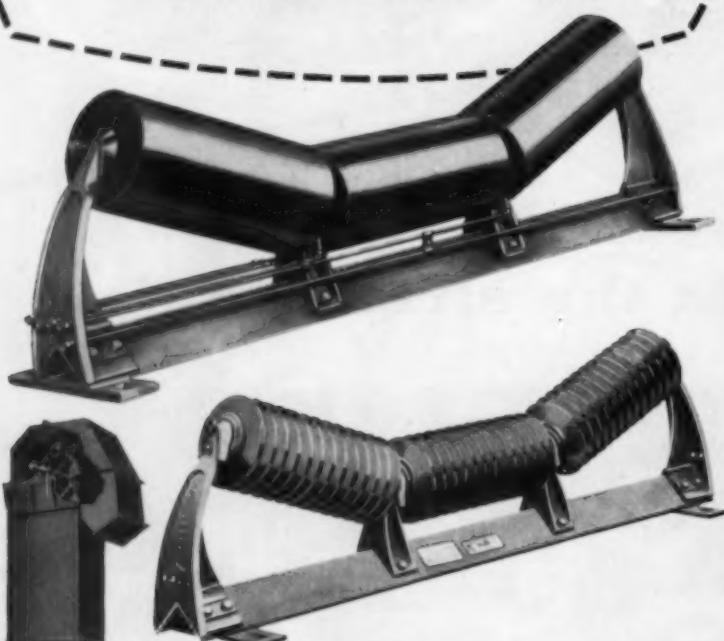


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Rocky Mt. Institute (Continued)

assistant to general manager—operations, Columbia-Geneva Steel Div., United States Steel Corp., San Francisco. In the next 10 yr capacity was raised to 5,069,000 tons. On Jan. 1, 1957, the rated capacity of the western steel industry was 7,873,300 tons. By 1965, the Columbia-Geneva Commercial Research Dept. estimates, on the basis of the western mills supplying 68% of the requirements as at present, the demand will rise to about 16 million tons. If the 68% figure is improved on, as expected, the demand will be even greater.

Western coke-making capacity doubled between 1938 and 1948 and has since increased an additional 45%. Present capacity is about 3.7 million tons annually, which will require about 6 million tons of coal, mostly from Colorado, New Mexico and Utah.

Ingot capacity of the Geneva works was 1,283,000 tons in 1948, and was increased over 45% in the next 6 yr, with a further 20% increase in 1955. Completion of the program in late 1957 will raise the ingot capacity of the Geneva works to 2,262,000 tons, or nearly 1,000,000 tons over the 1948 level.

A concurrent increase in the productive capacity of the Columbia-Geneva coal mines has been required by this increase in steel capacity. Continuous mining and roof bolting is being expanded, and a new 9x13-ft rock tunnel 8,700 ft long is being driven at Columbia for increased safety as well as efficiency. A 600-tph cleaning-in-transit plant is being built at Wellington, Utah, to handle all the output of the Columbia and Geneva mines, as well as the Somerset mines in Colorado.

Over all, Mr. Scheble concluded, "the expanding industrialization of the area, which must result from a continuing population growth, will undoubtedly increase the demand on the entire western coal industry."

NCA ACTIVITIES

How the National Coal Association is serving the coal industry was the subject of a presentation opening the fourth technical session by L. Newton Thomas, NCA president, and president, Carbon Fuel Co., Charleston, W. Va. Mr. Bridwell presided at the session, and Mr. Thomas was specially introduced by J. S. Besser, The Colorado Fuel & Iron Corp., Denver, and an NCA director.

Production forecasting, a new NCA activity, is improving, Mr. Thomas reported, and the association is making progress in informing the public about gains in efficiency, safety and service. The atomic energy committee of the association is working to see that the government does not subsidize nuclear competition. The educational committee is exerting itself to interest high school and college students in coal mining as a career, and the association is actively engaged in trying to keep freight rates down. The safety department, in addition to its other work, is working for a 50% reduction in roof-fall injuries.

A major aim of the association, Mr.



This Bucyrus-Erie walking dragline is stripping rock overburden in a West Virginia coal mine.

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The economical operation, big production and year-after-year dependability of Bucyrus-Erie walking draglines make them pace setters wherever big volumes of overburden must be moved at lowest possible cost. You'll find them in coal mines from Missouri to Morocco . . . from Pennsylvania to the Philippines.

Each member of this famous line, from 4 to 34 cubic yards, brings you the same low cost and dependable performance that has been associated with Bucyrus-Erie walking

draglines for years. Heavy-duty construction from base to boom point cuts maintenance costs, adds years to machine life. Each machine has proved Bucyrus-Erie design superiority—a front end that's very strong yet light in weight—exclusive walking action with design simplicity that minimizes maintenance, gives you cushion-smooth moveups. These and many other features combine to give you a high-volume, low-cost-yardage excavator that sets the pace wherever it works.

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Rocky Mtn. Institute (Continued)

Thomas concluded, is creation of a better climate in Washington—in Congress and at the White House—to make sure that Congress and the Administration understand that coal is a basic industry, that its contributions are vital to national welfare, and that it gets fair treatment.

MANUFACTURERS' HOUR

A feature of the 1957 institute program was the "Manufacturers' Hour." Subjects and speakers were as follows:

Coal Mining With AC Power, T. A. Hohing, Westinghouse Electric Corp. There is a trend to AC at the face because of better regulation and thus better voltage. Fairly recent AC equipment includes the portable mine-type power center and the portable mine-type sectionalizer for 2,300 v and higher. On the DC side, new types of units include a 100-kw skid-mounted selenium rectifier. Mercury arc rectifiers have been improved and DC sectionalizers are worth careful consideration for protection of distribution systems.

New Shuttle-Car Cable Developments, C. B. Peck, Anaconda Wire & Cable Co.—Shuttle-car cables still present the toughest design problems, but life has been increased 3 times over that of a few years ago by advances in cable and shuttle-car design and more care by the operator in use. But longer life created another problem—strand breakage. This problem is being met by building in greater flexibility and by designing to eliminate copper fatigue not only in the ground wire but in the conductors.

Mr. Peck registered bitter opposition to suggestions for changing to round ground wires because of increased cutting and changes in cable which would make it bigger and more expensive, in addition to rendering all present stuffing boxes non-permissible. On the subject of cutting, recently developed neoprene insulation helps materially in raising compression-cutting resistance. Better jackets reflect better rubber compounding.

The Yieldable Arch, Frank T. Saunders, Bethlehem Pacific Coast Steel Corp.—Along with design principles, Mr. Saunders presented typical coal and metal applications through the medium of slides.

Hydraulic Oils, J. Wiley Brischoff, The Texas Co.—Through the medium of a motion picture, the various grades of hydraulic oils were compared for resistance to rusting, oxidation and foaming in service. Conclusion: the premium grades pay off.

New Oil Products, Kenneth J. McLeod, Socony Mobil Oil Co.—Socony-Mobil offers fire-resistant fluids—at a price—but no other liquid does as well as fluids based on petroleum. Also available is a petroleum-base grease for bearings operating at 250 to 500F, plus a semi-fluid type modified from the other, as well as lithium and moly-disulphide types.

Mine Lighting, D. F. McElhatten, Mine Safety Appliances Co.—Two permissible mine-lighting systems are now available for greater safety and efficiency at the face and elsewhere in the mine,



◀ Compare the Costs of A Blast Like This:

SPENCER A/N MIXTURE	.06c
LIQUID OXYGEN EXPLOSIVES	.09c
COMMERCIAL A/N BLASTING AGENTS	13.5c
COMMERCIAL DYNAMITES	.18c

YOU CAN CUT BLASTING COSTS UP TO 50% with new ammonium nitrate blasting process pioneered by Spencer Chemical Company and Maumee Collieries.

Let Spencer Chemical Company Show You

How To Get Better Results With New Ammonium Nitrate Blasting Process

Maximum benefits from new blasting method demands knowledge of nitrate types, packing, detonation, etc. Pioneer supplier of ammonium nitrate for blasting, Spencer offers you free technical advice and service.

The startling announcement of a revolutionary new, low-cost blasting method was made about two years ago. The technique, developed by Maumee Collieries using Spencer Prilled Ammonium Nitrate, cut blasting costs up to 50%. Also, improved fragmentation made this method about 25% more efficient.

The importance of this new method to you has now been affirmed by practically all major dealers in explosives. But almost each month new data reveals improved techniques by which even greater savings can be made.

Continuing our pioneer work begun with Maumee Collieries—Spencer has since made intensive tests using am-

monium nitrate for open-cut blasting for coal, iron, and rock. In fact, Spencer Chemical Company is prepared to offer you the latest and most complete available data about almost every open-cut blasting situation in this hemisphere.

To get the full benefits of this accumulated knowledge and experience, consult Spencer Chemical Company when you are ready to find out for yourself about this wonderful new blasting process. Spencer's special bulletin, "Cut Blasting Costs With Spencer Prilled Ammonium Nitrate," and the most expert technical advice in the country are yours for the asking. Mail the coupon—today!

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Please have a Spencer Technical Service Representative call—without cost or obligation to me.

Name _____

Company _____

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Post Office. _____ State _____

Open Pit Meet (from p 135)

cause cavitation, Mr. Gunnoe reported.

Commutator wear is broken down into various types, Mr. Gunnoe said. Among the various types illustrated and explained were threading, cutting, grooving, drag and pattern.

Mining research at the University of Illinois is being carried out in several fields, Prof. Wright said. Ventilation research is aimed at tracing fugitive air, which is that portion of the fresh air lost before it reaches the face. To date, results show that 36 to 80% of the fresh air is lost as fugitive air. This is of immediate economic importance because two tons of air are circulated for each ton of coal recovered.

Research also is being done on the physical properties of rock. This work includes development of testing methods. Studies also are under way to determine the caking and coking properties of various coals, and drilling characteristics of roof for roof bolting.

USEFUL IDEAS

With L. A. Selleg, Westinghouse Electric Corp., acting as chairman, members of the program committee described various mine-developed ideas. Mr. E. T. Groat, manager, mining division, General Electric Co., posed the question of whether companies are giving enough attention to how they store spare equip-

ment, such as, m-g sets and coils. He recommended that a committee be appointed to study methods and come up with an answer on the question of what is the best method of storing equipment to get long life and eliminate the cause of misunderstanding when companies exchange spare parts.

Howard Nunn, electrical engineer, Ken Coal Co., described an automatic truck washing device at the Ken mine. Trucks pass through a steel arch fitted with water sprays that direct water onto the truck body. It takes only 2 or 3 min to wash mud and loose dirt off a truck and thereby prevent future caking. Mr. Nunn said that he believed that washing the trucks saves labor and also results in better repair jobs when they are overhauled.

A cable-fault locator, designed by C. R. Lemon, plant engineering superintendent, U. S. Gypsum Co., was described by G. J. Reynolds, U. S. Gypsum Co. Charles Bledsoe, Stonefort Corp., described how electrical equipment was cleaned effectively by blasting with ground corn cobs and at a considerable savings in time.

R. T. Taylor, Peabody Coal Co. described portable substations for use in strip pits. These units are designed for easy moving and can be hooked up in a minimum of time. Wesley Curry, Gibraltar Coal Co., explained how labor is saved by using portable disconnect

switches and portable substations at the Gibraltar mine. J. C. Rettenmayer, United Electric Co., reported on re-editing the book of spare parts.

Rocky Mtn. Institute (from p 148)

one for a 2-pole isolated ungrounded circuit and the other for a 3-pole grounded operation. The key is the M-S-A fluorescent lighting fixture for operation on 118-v 60-cycle single-phase.

"Surveys have confirmed increased tonnages from lighted sections. Better housekeeping and more orderly control of supplies will follow. There is less fatigue of the miner because of a decrease in useless motions resulting from inability to see the entire surroundings." Better vision also will compensate for inability to hear as well where machines are used.

New Developments in Tungsten-Carbide Tools, Duane Saxman, Kennametal, Inc.—Development of the carbide tool reduced bit-changing time and made possible high-capacity cutters and continuous miners. Introduction and use made it necessary to develop a sound maintenance program.

The greater demands on bits for boring-type miners led to the development of the tapered-shank type, which also reduced bit-changing time. Research in the tapered-shank bit is continuing. And in the field of shanks, it is being recognized that the $\frac{3}{4}$ x 1 type has certain deficiencies, with the result that machine manufacturers are planning to increase the effective cross-section.

The throwaway carbide bit was developed for very hard cutting where destruction is inevitable, but also is turning out to be an economical tool for soft cutting. Some operators have obtained 6 to 8 regrinds.

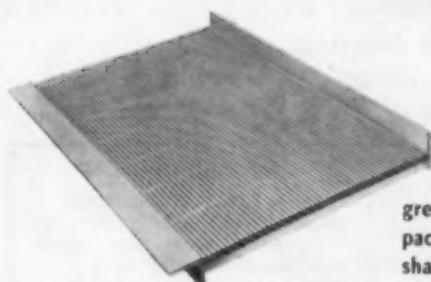
Strip and Open-Cut Blasting, C. W. Brown, Atlas Powder Co.—Motion picture, "The Inside Story," detailed advantages of the "Rockmaster" blasting system, emphasizing the importance of bottom-of-the-hole initiation.

UTILIZATION RESEARCH

A report on coal utilization research by the Natural Resources Research Institute of the University of Wyoming, by Edward Prostel, was a feature of the final technical session, with Albert M. Keenan, president, Thompson Creek Coal & Coke Co., Denver, presiding. Coal work has been conducted for over 10 yr, starting with briquetting of sub-bituminous coal, then going to fluidized drying and recently to low-temperature carbonization, or charring.

Chemical by-products are valuable but recovery is expensive, Mr. Prostel noted. Must it therefore be concluded that carbonization cannot be done? Not necessarily, since such carbonization might be likened to the early days of the taconite industry. Charring is favored by higher oil prices and the scarcity of coking coal. It is a good source of activated carbon, and a possible application is as an ingredient of a phosphate briquet to supply carbon during the reduction process.

GIVES COAL A REAL CLEAN SCREEN!



You keep coal quality high when you give it a Hendrick Wedge Slot screening! Hendrick Wedge Slot has the kind of small openings that assure fine screening yet affords far

greater draining and screening capacity. Profile bars are "precision shaped" to maintain uniform width of slot openings the entire length of the screen as wear progresses. For details on the Hendrick Wedge Slot Screen best suited to afford long life under your specific operating conditions, write Hendrick today.

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Hendrick Wedge Wire Screens • Architectural Grilles • Mitco Open Steel
Flooring • Shur-Site Treads • Armorgrids • Hydro Dehazers
• Petrochemical Column Internals



Drilling square holes in cutter bar of Continuous Mining Machine. Leman was first to drill the square holes for the new style, carbide bits.

Cutting away the worn-out wearing plates from the main frame of Continuous Miner.

Rebuilding of Continuous Miner begins with complete dismantling for careful inspection of every part.

Leman rebuilds Continuous Miners to better than original condition in record time

... with
speedy repair service pick-up
right at the job site

Your worn-out mining machinery comes back as good as the day it was purchased—if it has been rebuilt by Leman. Or it will come back better than new with Leman improvements and latest model modifications.

The production views at left show Leman specialists rebuilding a continuous mining machine. The cutter bar in the top view will be better than new—changes in bit design have eliminated the holding plate and improved the customers' equipment. Completely new manganese steel wear plates go on the main frame in the center view. Leman cuts repair time on this work by having torch and chipper outlets at every worker's station.

Look how Leman workmen in the bottom photo leave nothing to chance. Everything—down to the last bolt—gets checked for accuracy. And, just as with this continuous miner, Leman rebuilding or repair jobs on the heaviest mining equipment, electric locomotives, etc., assure you of "good-as-new" performance.

Phone or write for prompt,
courteous service on your repairs.

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The 6" Pump that handled 10" PIECES OR SLATE!

When the operators of a West Virginia mine installed this 6" Wemco Solids Pump, they put it to work handling 2½ x 0 Chance Cone Reject, pumping 500 GPM at 25' TDH. It not only proved to be the most efficient coal-handling device they had ever seen, but it also consistently passed pieces of slate as large as 4" x 10" and occasional tramp iron and other debris — without stopping!

The Wemco torque-flow Solids Pump works on the unique principle of a "can't-clog" liquid impeller. Write for complete details on this amazing new pump, now in use by dozens of mines, cleaning plants, preparation plants, and other coal operations.



WEMCO
TORQUE-FLOW
SOLIDS
PUMP



Current Coal Patents

By Oliver S. North

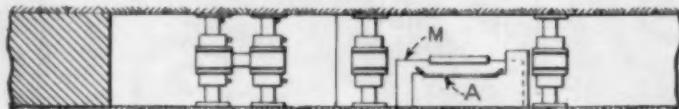


FIG. 1

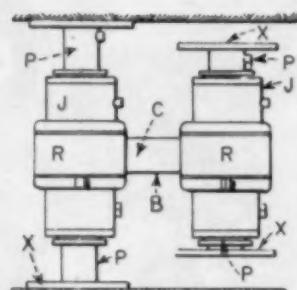


FIG. 2

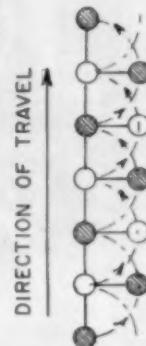


FIG. 3

Walking Jack

Rotating hydraulic roof supporting jacks, W. J. Jenkins (assigned to Joy Mfg. Co., Pittsburgh, Pa.), June 18, 1957. The patent covers a design for a walking, hydraulic, roof-supporting jack unit. The unit is composed of two jacks connected by a rotating coupling member. While alternately one jack and then the other sustains a roof, the remaining jack is collapsed and pivoted to a new support position.

Figure 1 shows a vertical section of a mine room. On the left appear both jacks of one unit. On the right one of the jacks of each of two separate units has been placed to protect an advancing mining machine, M, and conveyor A.

Figure 2 shows an elevation view of the jack unit. Jacks J, J are joined by connection C consisting of horizontal bar B and rings R, R, which encircle the jacks. The rings are fixed against longitudinal movement. Piston rods P, P are extended and contracted by fluid pressure. When in position the rods are extended to permit plates X, X to engage the floor and roof. For movement a jack is contracted as shown, swung in an arc to a new position, and the piston rods extended. Figure 3 shows one mode of advancing a unit of this type. No. 2,795,934.

Walking roof support, C. W. Fitzgerald (assigned to Joy Mfg. Co., Pittsburgh, Pa.), June 18, 1957. A design for a walking roof-supporting apparatus that is particularly adapted to the protection of long pieces of equipment, such as continuous mining machines. Each unit comprises four jacks supporting two I-beams and connected for relative move-

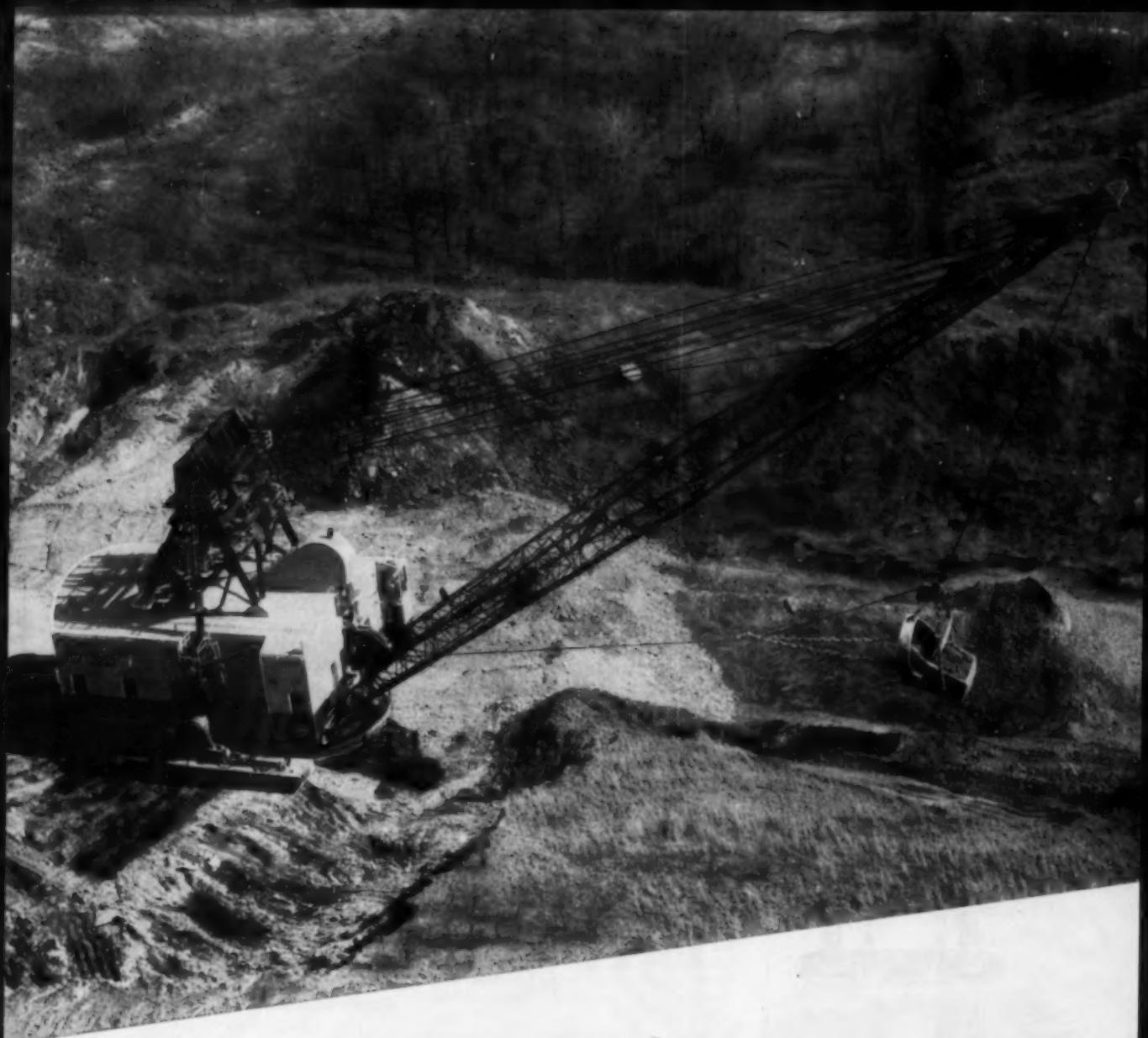
ment by a walking motor. As many jack units as needed may be used, depending on roof conditions and length of mining machine. No. 2,795,935.

Walking roof support, W. A. Blower and R. L. Ziegler (assigned to Joy Mfg. Co., Pittsburgh, Pa.), June 18, 1957. This walking roof-supporting mechanism for protecting continuous mining machines is highly mobile in use, permitting maximum operation of the machine. Hydraulic jacks sustain roof-supporting members. No. 2,795,936.

Coal mining machine with cutter bars capable of swinging laterally and adjusting vertically, J. F. Joy (assigned to Joy Mfg. Co., Pittsburgh, Pa.), June 18, 1957. A mining machine especially designed for use with the so-called "bore and spray" method of coal mining. The mechanism has an improved cutter bar arrangement and means for adjusting the cutter bars into spray cutting position. No. 2,796,246.

Centrifugal separators, N. O. Peck (three-fourths assigned to William H. Peck, Tulsa, Okla.), June 25, 1957. Design for an improved centrifugal separator that can be adapted to de-watering coal fines. Moisture removal is so complete that the material can be used directly without further undergoing a heat or air drying procedure. No. 2,796,990.

Reclaiming apparatus, C. L. Huntzinger (assigned to Hewitt-Robins Inc., Stamford, Conn.), July 2, 1957. Design for an improved apparatus for handling material, for example coal, being re-



AERIAL VIEW OF GIANT DRAGLINE

A low-flying plane provides this view of a Marion 7800 Walking Dragline at work in a southern Ohio coal stripping mine. The 7800 carries 35 yard buckets on 220-foot booms to meet a variety of special problems involving big yardage and long range.

Marion continues to strengthen its leadership in the coal stripping industry. In addition to draglines of many sizes, Marion manufactures shovels up to the Type 5760, largest shovel in the world. Five Marion 5760 machines are completed or in production.

MARION POWER SHOVEL COMPANY, MARION, OHIO

Coal Patents (Continued)

claimed from a layered stockpile. No. 2,797,823.

Raising coal or other minerals in mine shafts, J. J. Torrance and F. Ashley (assigned to Coal Industry (Patents) Ltd., London, England), July 2, 1957. A plant for mechanically hoisting coal or other minerals comprising a three-compartment operation in which the containers are moved on and off loading platforms at the top and bottom of the shaft by automatically actuated switching. The need for large run rounds, tub circuits, creeper and tipplers and associated housings is eliminated. In addition, the amount of dust is lessened. No. 2,797,834.

Cascade conveyor, E. R. Bergmann (assigned to Goodman Mfg. Co., Chicago, Ill.), July 9, 1957. An articulated cascading conveyor for use with a continuous miner makes unnecessary the use of cross entry conveyors to receive discharge from each room as the machine advances. No. 2,798,587.

Supports for endless conveyors, C. O. Wood (assigned to Goodman Mfg. Co., Chicago, Ill.), July 9, 1957. A design for an improved support for the spaced flexible strands of a rope frame conveyor.

The support can shift bodily or cant with suitable limits. No. 2,798,589.

Suspension means for conveyor belt, C. Stamos (assigned to The United Electric Coal Cos., Chicago, Ill.), July 9, 1957. A flexible means for supporting a coal mine conveyor belt enabling the belt to shift into a position to carry an unbalanced load, thereby lessening belt wear. No. 2,798,591.

Apparatus for separating solid materials by suspension, M. Dru (assigned to Ste Jaruza A. G. Chur, Zurich, Switzerland), July 9, 1957. Design for an improved sink-float apparatus for separating slate, sand and other heavy impurities from coal by means of a suspension. Dense liquid discharged with float material is recycled back into the washing bed of the apparatus. No. 2,798,606.

Mining machine rotary boring head having radially adjustable cutting arms, M. G. Thassy (assigned to Goodman Mfg. Co., Chicago, Ill.), July 9, 1957. An improvement in the type of telescopic adjustment at the outer ends of mining machine boring arms. Extension and retraction is accomplished by means of a pair of shiftable gears. No. 2,798,708.

Mining machine of the rotary type having reciprocating impact means, J. P. Ruth, July 9, 1957. A design for a coal mining machine of compact, powered unit form. The excavating head acts to rend and disrupt rather than cut and abrade the mineral in which it is working. No. 2,798,709.

Continuous mining apparatus of the pivoted boom type, C. F. Bell (assigned to Joy Mfg. Co., Pittsburgh, Pa.), July 9, 1957. A design for an improved mining and loading apparatus especially adapted to be used in underground mines having low headroom. Shooting the face is not required. No. 2,798,712.

Apparatus for continuous mining and loading, J. R. Sibley (assigned to Joy Mfg. Co., Pittsburgh, Pa.), July 9, 1957. An underground mining and loading apparatus low in height, maneuverable and compact, which operates with no need of blasting the face. No. 2,798,713.

Continuous mining apparatus of the (assigned to Joy Mfg. Co., Pittsburgh, Pa.), July 9, 1957. Design for an improved, low-headroom, coal mining machine that will operate in a thin solid seam without use of explosives. No. 2,798,714.

Bit holder for cutter chains, C. H. Brown (assigned to Goodman Mfg. Co., Chicago, Ill.), July 9, 1957. As an improvement in the mounting of cutter bits in mining machine cutter chains a lug is provided which relieves the set screw from all of the load of cutting. The bit is gripped with better leverage and held more effectively. No. 2,798,715.

Books for Coal Men

Coal Petrography

Petrography of American Coals, by B. C. Parks and H. J. O'Donnell. This report concentrates in a single volume knowledge obtained by American scientists in 50 years of research. The report presents detailed data on the appearance and properties of samples from 160 coal beds mined in various areas of the United States. Also included is an explanation of the USBM system of describing and classifying coals on the basis of microscopic study of thin sections. *Bulletin 550 \$1.75. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.*

Coal Analysis

Analyses of Tipple and Delivered Samples of Coal (Collected During the Fiscal Year 1956), by S. J. Aresco, C. P. Haller and R. F. Abernathy. Results of analyzing 10,000 samples from hundreds of mines in 22 states and Alaska are summarized in the report. Analyses are arranged alphabetically under states, counties and mines. *R. I. 5332, Bureau of Mines, Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Heating and Air Conditioning

The Heating Ventilating and Air Conditioning Guide 1957 is the 35th edition published by the American Society of Heating and Air-Conditioning Engineers. Containing practical technical and design data, the work has been expanded to include the latest available information. Changes include revision of old material plus a new chapter on Control of Industrial Environment, 115 new illustrations and many new tables. 1,250 pp plus charts. 6x9-in.; cloth. \$12, American Society of Heating and Air-Conditioning Engineers, 62 Worth St., New York 13.

Coal Gasification

Gasification of Pulverized Coal in Suspension, by C. G. von Fredersdorff, E. J. Pyrcioch and E. S. Pettyjohn. This bulletin includes experimental data and observations obtained in a study of the gasification of pulverized Illinois non-coking and West Virginia low and ash-fusion coking coals in suspension with air, oxygen and steam mixtures. It also presents a summary of the initial IGT gasification studies, made with an atmospheric pressure gasification unit. *Research Bulletin 7, 72 pp. Institute of Gas Technology, Chicago 16, Illinois.*

Dust Explosions

Studies on the Development and Control of Coal-Dust Explosions in Mines, by Dr. Irving Hartmann. This report reviews more than 45 yr of Bureau of Mines research on coal-dust explosions and summarizes results of 2,500 large-scale tests and experiments. *I. C. 7785. Bureau of Mines, Publications-Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

RUGGED... MORE EFFICIENT

CINCINNATI CHAINS for every type of continuous miner



In addition to making a broad line of chains, bits and bars for conventional miners, "CINCINNATI" IS AHEAD OF THE FIELD in the development and production of RUGGED... MORE EFFICIENT CHAINS for every type of CONTINUOUS MINER. As a matter of fact, at this time we are designing cutting equipment for many machines now in the development and testing stage. Whatever your requirements, "CINCINNATI MINE" has chains, bits, bars and sprockets that will handle your particular cutting job better. We'll be glad to work with you.



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USS SPECIAL STEELS

minimize break-in time • step up production
increase service life • reduce maintenance cost

FOR MODERN COAL-HANDLING PLANT

On its way from the mines at Lynch, Kentucky, to the Lake Shore coke plants, raw coal makes a very important stop at Corbin, Kentucky, at the U. S. Steel coal-cleaning plant. Here the coal is crushed, carefully blended to assure the best possible mix of coking coal, and finally cleaned and dried.



Over-all view of Corbin Plant

Throughout this plant, various USS Special Steels have been used to reduce operating and maintenance costs and to assure longer life in abrasive and corrosive applications. These steels include USS Stainless Steels, USS COR-TEN and USS MAN-TEN High Strength Steels, and USS Abrasion-Resisting Steel. Each is used for a specific purpose. USS COR-TEN Steel is used for chutes to provide the necessary corrosion resistance and load-bearing strength with minimum weight. To assure the utmost in abrasion resistance, these chutes are lined with wear plates of USS A-R Steel. Typical examples are hoppers

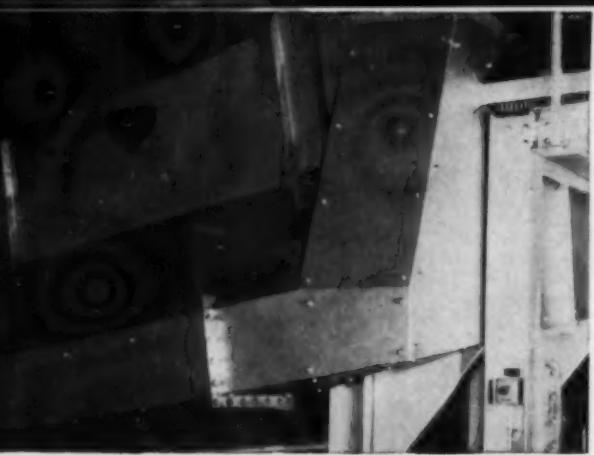
and blending chutes, discharge and diversion chutes which are made of $\frac{3}{16}$ " USS COR-TEN Steel lined with $\frac{3}{8}$ " USS Abrasion-Resisting Steel.

Where corrosion resistance and slideability, in addition to longer life, are of paramount importance, USS Stainless Steels are used alone or in combination with USS COR-TEN Steel. USS Type 410 Stainless Steel is used to line the $\frac{3}{8}$ " COR-TEN Steel refuse sumps, the Chance-cone sump, the Bird effluent sump and the water-supply head tanks. Stainless Steel is used for the clean-coal and refuse sluices and in similar wet applications.

Divertor chute feeding raw coal into distributor is built of $3/16$ " USS COR-TEN Steel and lined with $\frac{3}{8}$ " USS A-R Steel.

Hopper and chute from blending bin. Outside is $3/16$ " USS COR-TEN Steel with $\frac{3}{8}$ " plates of USS A-R Steel bolted on inside.





Outside of sluice—handling fines and refuse in water—is made of 3/16" COR-TEN Steel and lined with 3/16" Type 410 Stainless Steel.



Raw coal chute of 3/16" COR-TEN Steel lined with 3/16" Type 410 Stainless Steel.

Another important application of USS Stainless Steel is for the woven wire and perforated screens. Stainless Steel stands up extremely well here. It is estimated that the Stainless Steel screens will outwear carbon steel by three times, and they are far less apt to clog or "blind." Among the Stainless Steel screens used in the Corbin Plant is the first American application of the German Nein-Lehmann radial slurry screen which receives the slurry from the clean coal desanding system.

This screen used for reclaiming sand from the Chance-cone chute is Stainless Steel. The chute is USS COR-TEN Steel lined with Type 410 Stainless Steel.



Although these USS Special Steels for Mining Service have higher initial cost than structural carbon steel, the additional expense was fully repaid during the breaking-in period. Normally a plant of this type would require from 60 to 90 days to break in. But the Corbin Plant was operating fully in just one week, and much of this was due to the use of these Special Steels. An interesting point on the increased efficiency resulting from the use of these Special Steels is that this plant, scheduled to handle 600 tph., is now handling 800 tph. USS COR-TEN Steel, USS MAN-TEN Steel, USS Stainless Steels and USS Abrasion-Resisting Steel will continue to serve the Corbin Plant by assuring longer life, fewer breakdowns, less down time, smoother, faster operation and increased production. That's why we say that in the long run, *USS Special Steels for Mining Service don't cost more.*



At the end of the line plant, reject is pumped through this USS MAN-TEN High Strength Steel pipe to the refuse area.



UNITED STATES STEEL CORPORATION, PITTSBURGH
AMERICAN STEEL & WIRE DIVISION, CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
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**USS
SPECIAL STEELS
FOR
MINING SERVICE**

UNITED STATES STEEL

Personal Notes



Merl Kelce Heads Peabody

Merl C. Kelce was elected president of the Peabody Coal Co., to fill the vacancy created by the death of his brother, L. Russell Kelce. Prior to his election as president, Merl C. Kelce had been senior executive vice president of Peabody Coal Co. He began a career in coal in 1924 with the Sinclair Coal Cos., and was in charge of the group when it was affiliated with Peabody Coal in 1955. T. L. Kelce, a third brother, was promoted to senior executive vice president, relinquishing the post of executive vice president.

Consol Promotes Five

The Consolidation Coal Co. (W. Va.) Div., Pittsburgh Consolidation Coal Co., announced five promotions among its operating men. The promotions: **K. K. Kinell**, superintendent of Loveridge mine, Fairview, W. Va., was appointed division superintendent in charge of Consol No. 93, Jamison No. 9, and Loveridge. All three mines are situated in West Virginia's Marion County. The remaining four promotions went to **Harry Turner**, superintendent of No. 93, who was appointed superintendent of Loveridge; **Robert Quinn**, superintendent of Consol No. 63, Monongah, W. Va., to superintendent of No. 93; **Harry Williamson, Jr.**, assistant superintendent of No. 93 to superintendent of No. 63; and **Charles Herndon**, preparation engineer of No. 93 to assistant superintendent. The promotions were announced by **George L. Judy**, vice president of operations.

Rodney W. Selders joined the staff of the Trux-Traer Coal Co.'s Lignite Coal Div. Mr. Selders, a combustion engineer, was formerly attached to the U. S. Bureau of Mines in Maryland where he had served as a combustion consultant since 1950. From 1939 to 1950, excluding 4 yr with the U. S. Army, he had been employed by the Wolf Den Coal Corp., Shallmar, Md. Between 1934 and 1938 Mr. Selders was associated with the Oakmont Smokeless Fuel Co. and the

Davis Coal & Coke Co., West Virginia.

Edgar B. Jenkins was appointed superintendent of No. 31 mine, Lynch, Ky., by the U. S. Steel Corp. Mr. Jenkins became associated with the company in 1925. In addition to Mr. Jenkins' appointment U. S. Steel mine officials named **Henry Shackelford** general mine foreman of No. 31, **Albert Poff** general mine foreman of No. 32, and **Kerns E. Shelley** mine inspector of No. 31.

John C. Sherman was appointed vice president and secretary of the Black Diamond Coal Mining Co., Birmingham, Ala.

Paul Weir, chairman of the board of Paul Weir Co., Inc., consulting engineering company, Chicago, Ill., was elected to honorary membership in Great Britain's Institution of Mining Engineers.

Obituaries

Peabody President

L. Russell Kelce, president of the Peabody Coal Co., died June 30 in a St. Louis hospital at the age of 59.

The career of Russell Kelce was an exemplification of leadership in establishing and administering successful enterprises.

Born in 1897 in Pittsburg, Kans., where his father David owned and operated a small coal mine, Russell Kelce became a summer time miner as a boy of 12. At the age of 15, after an accident had injured his father severely and destroyed the family mine, he left school for a full time job handling mine cars for the Western Coal & Mining Co. In 4 yr, at the age of 19, so highly regarded had he become among area operators, he was appointed superintendent of a mine owned by the Ellsworth-Klener Coal Co.

With the entrance of the United States into World War I, Russell Kelce joined the Army, emerging as an infantry sergeant. After his discharge he moved to Tulsa, Okla., to raise capital and lease a strip mine at nearby Dawson. The mine, named the Leavell Coal Co., was so successful that its initial indebtedness was paid off many months before maturity.

Meanwhile, another man — **Grant Stauffer** — had been building the Sinclair Coal Co., a coal sales organization, into a prominent business. An agreement between the two men, Kelce and Stauffer, combined the companies into a corporate mining and sales team that proved profitable from the beginning.

By 1931 Mr. Kelce had been named vice president in charge of operations of the Sinclair Coal Co. Two years later he became its president. During the years that followed Sinclair emerged as one of the west's leading producers. In 1941 it ranked 29th in the nation. By 1951 it was sixth. By 1954 it was pro-



ducing 9.2 million tons a year and grossing \$35 million.

Then in July, 1955 Peabody Coal Co. acquired Sinclair and, at the same time moved the personal stock of L. Russell Kelce even higher by the announcement that he had been named president and chief executive officer.



Charles A. Owen, chairman of the board of the Imperial Coal Corp., New York, N. Y., and former president and director of the National Coal Association, died July 20 in Miami Beach, Fla. Mr. Owen was 73. An engineer by profession, Mr. Owen was born in Marion, Ohio. Graduated from Ohio Northern University with a degree in civil engineering, he entered the coal mining business in 1911 by forming the Smokeless Coal Co., near Johnstown, Pa. Later, after acquiring a number of other properties he consolidated his holdings in 1920, naming the corporation the Imperial Coal Corp.

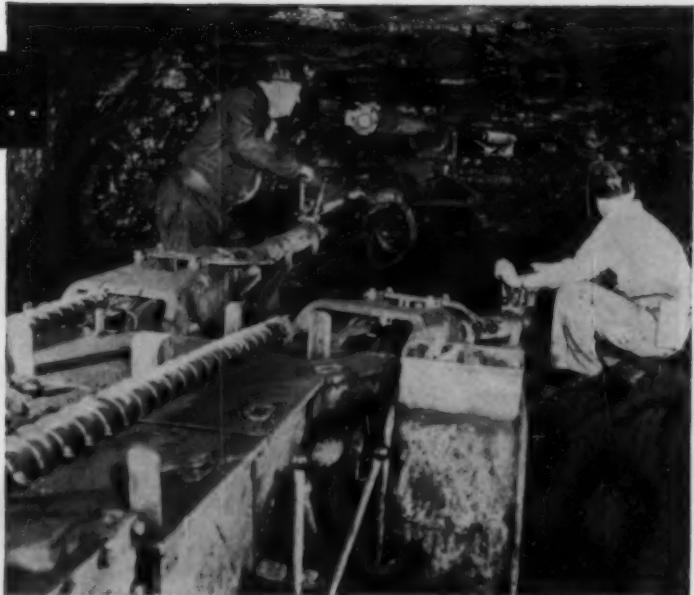
Active in the affairs of the National Coal Association and the Coal Exporters Association, Mr. Owen had been a director of the NCA since 1930. He had at various times served as its president and as vice president. He was also a director of the Coal Exporters Association, an organization which described him as "the moving spirit in founding and incorporating the CEA." He served, in fact,

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For hand-held drilling

For power-fed drilling



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with CARMET DRILL BITS

Carmet coal drill bits—with unique tip designs—consistently drill clean, straight holes . . . *fast*, giving you increased production along with greater economy of operation.

Four different bit styles allow a range of selection to suit your mining conditions and drilling equipment, whether hand-held or power-fed. All styles are furnished with hardened alloy steel shanks, heavily backed at the tips to support a harder grade of carbide for greater wear resistance.

Extra carbide length along the outside cutting edge of the tip prolongs bit life and permits total use of the carbide. Cuttings are quickly, easily removed by the wide scoop design of the tool.

See your Carmet distributor for advice on the proper drill bits for your operations. He will be glad to help you set up a tooling program that will profit your operations. *Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Michigan.*



Write for your copy
of the CARMET
MINING TOOL CATALOG
and METHODS MANUAL

Illustrates full line of Carmet mining bits . . . giving tool dimensions, rake and clearance angles, etc. Specifies grinding wheels and procedures for reconditioning tool bits.

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WWW 8810

Industry's newest shuttle car... powered



by a single Westinghouse motor

National Mine Service Company's "TorKar" powered by a Westinghouse type SK motor sets new standard for shuttle car operation

New performance and maintenance standards have been established by this modern shuttle car design in over four years of actual field tests. A single ac or dc motor supplies all required power for the machine, with a torque converter for protection against overload.

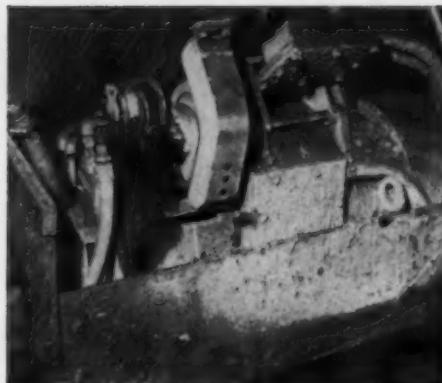
The Westinghouse Type SK motor on this unit is a flange-mounted, totally enclosed fan cooled, Bureau of Mines-Approved, Explosion-proof type, with the

extra stamina required to meet rugged mine requirements. Westinghouse design provides for better commutation, longer bearing life, and easy access to commutator and brushes.

Get all the facts about Westinghouse mining motors, both standard and special, by calling your Westinghouse sales engineer. Or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-22061

YOU CAN BE SURE...IF IT'S
Westinghouse



It's easy to see this motor isn't pampered. Dirty, dusty, damp conditions have not been able to stop this 25 hp Westinghouse Type SK motor from delivering its full rated capacity as the single power source for National Mine Service Company's "TorKar."

Among the Manufacturers

This was the news:

Expansion Progresses

Kennametal, Inc., finished enlarging its Chestnut Ridge, Pa., and Detroit, Mich., plants then announced that a plant being built in Bedford, Pa., would be ready to operate late this summer.

The Chestnut Ridge plant enlargement provides 24,000 ft of floor space for the company's forming specialties department. It is situated near Latrobe, Pa., on a 1,200-acre site. The Detroit plant expansion will increase Kennametal's production by 50%. In Bedford the new plant will double the company's capacity to produce carbide alloys used in cutter bits and drill bits. Kennametal's president, Philip M. McKenna, also announced that a plant built in Milan, Italy, by Kennametal Overseas Corp., a wholly-owned subsidiary, has begun producing carbides.

Dedication

Dravo Corp. dedicated its \$500,000 research center on Neville Island, Pittsburgh, Pa.

The structure houses facilities for the

company's Research and Development Dept., which was established in 1952. Dravo Corp., a manufacturer of diversified product lines, constructs coal-carrying river barges.

Mill Construction

The Leschen Wire Rope Div. began constructing a new wire drawing mill at its home plant in St. Louis.

The mill, which will be integrated with present wire rope manufacturing facilities, is expected to cost \$1.7 million. As a result of designing new equipment Leschen will be producing its wire rope by continuous line operation rather than by the usual batch type method.

Acquisition

Massey-Harris-Ferguson, Inc., bought Mid-Western Industries, Inc., Wichita, Kans., for an undisclosed sum.

Mid-Western Industries produces loaders, back-hoes, cranes, scarifiers, dozer blades, lifts, buckets and the Davis "Pit Bull." Charles J. Davis, president of the company was named division general manager. Mid-Western sales totaled \$8.5 million last year. Sales in 1957 have averaged \$1 million a month. Massey-Harris-Ferguson will continue to market Mid-Western products under the "Davis" brand name.

The LeRoi Div., Westinghouse Air Brake Co., began producing air compressors on a new production line at the company's Greenwich, Ohio, plant.

The compressors had been manufactured by Westinghouse's Industrial Products Div. before establishment of a production line at Greenwich. With the new facilities not only will Le Roi market the compressors (Y and G units), but make them as well.

The American Pulverizer Co. appointed J. B. Frescoln its southeastern sales representative.

Mr. Frescoln will sell the company's coal crushers and other reduction equipment in Alabama, Georgia, and Florida. His headquarters are in Atlanta, Ga.

Persinger Supply Co., Williamson, W. Va., was appointed a distributor for the Parker Appliance Co., Cleveland, Ohio.

The supply company will sell Parker reusable hose and tube fittings for mining equipment hydraulic systems.

The promotion of T. W. Krueger to sales manager was announced by the Duff-Norton Co., industrial jack and hoist producer.

The promotion puts Mr. Krueger in charge of all sales by the Jack and

Coffing Hoist Divs., including foreign and domestic. Mr. Krueger had been sales manager of Duff-Norton's Jack Div. before the promotion. He joined the company in 1947 as advertising and sales promotion manager, later served as assistant sales manager.

A. B. "Dutch" Walter, a pioneer in underground mine belt conveying, began a leave of absence from Goodyear Tire & Rubber Co. that will extend into retirement.

Mr. Walter, who received a 25-yr service pin in March, joined Goodyear at a company-owned mine in southern Ohio. Earlier he had been chief engineer of a mine. He has been a member of the American Institute of Mining and Metallurgical Engineers since 1924.

Rex H. Nielsen was appointed district sales manager of the Great Lakes territory of the Industrial Sales Div., Thermoid Co.

Mr. Nielsen will cover Kentucky, Indiana, Michigan and part of Ohio from his office in Indianapolis. Before the appointment Mr. Nielsen had been the company's San Francisco sales representative. Thermoid makes industrial rubber and asbestos products, including, hose, conveyor and elevator belting.

Dewey A. White and J. G. Wicks were appointed regional sales managers by the Okonite Co.

Mr. White, manager of the company's Birmingham, Ala., district since 1941, will supervise the activities of the Birmingham, New Orleans, and Dallas districts. Mr. Wicks will supervise the Philadelphia, Boston, Cincinnati, Syracuse, Detroit, Cleveland and Pittsburgh sales districts.

L. D. Craggs was appointed construction machinery sales manager of the Memphis Branch, Tractor Group, Allis-Chalmers Mfg. Co.

Mr. Craggs had been assistant construction machinery sales manager at Memphis before the appointment. Earlier he had held the same position at the Dallas branch of the company.

D. H. Mitchell was appointed eastern sales manager of the LeTourneau-Westinghouse Co.

The appointment places Mr. Mitchell in charge of the company's eastern sales division which includes 21 states and four Canadian provinces. He replaces James A. Vincent, who recently resigned the post.

Jules C. Laegeler was named chief engineer of the Frank G. Hough Co., Libertyville, Ill.

Mr. Laegeler had been manager of the company's Product Improvement Dept. He joined Hough in 1951 as an experimental engineer, later was made senior project engineer.

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4½ TO 14 CUBIC YARDS

HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA



Obituaries (from p 158)

several yearly terms as its first president.

In addition to participating actively in the NCA and the CEA, Mr. Owen had been a director of the Central Pennsylvania Coal Operators Association.

In 1950 he was named as the soft coal operators' representative on the United Mine Workers Welfare and Retirement Fund board of trustees.

Safety Pioneer

John Edward Jones, mine safety pioneer, died in Benton, Ill., July 2 at the age of 73.

As an employee of the Old Ben Coal

Corp. for nearly a lifetime, Mr. Jones had held the post of safety engineer from 1917 until his retirement in 1953. As a man devoted to a lifetime cause—mine safety—he was ranked more than a peer by the entire industry.

Among the practices he championed—practices which were once labeled foolish and impractical—were abolishment of open lights in gassy mines, ventilation of cross cuts, and rock dusting.

In 1915 he was named an Illinois State mine inspector with jurisdiction in Franklin and Saline counties, two counties with a heavy concentration of gassy mines. It was here that the lifetime campaign for safe mines began.

Frequent explosions and mine fires



compelled him to conduct extensive research and study programs in safety. His remedies, radical for their day, were ridiculed.

Finally, in 1917, after a Thanksgiving Day fire (initiated by explosion and fed by coal dust), swept the Christopher mine of the Old Ben Coal Corp., Mr. Jones was named safety engineer to develop and install rock dust and to change open lights to closed lights.

Under his guidance Old Ben revolutionized the safety features of mining.

By 1924 Mr. Jones was being regarded nationally as an expert in mine safety. Borrowing him from Old Ben, the U. S. Bureau of Mines sent him to the Rocky Mountain region to explain the use of rock dusting.

Later, when Old Ben acquired mines in West Virginia it was the influence of Mr. Jones that caused the introduction of rock dusting there, too.

William H. Prentice, former West Virginia mine inspector, died in Bluefield, W. Va. July 6. He was 74. Mr. Prentice began a lifetime association in the coal industry in his native Scotland when he took a job in Asgill, Lanarkshire, at the age of 11. Emigrating from Scotland, he arrived in the United States in 1906 where he found employment as a foreman, then as a mine superintendent in West Virginia's Fayette and McDowell Counties. In 1922 he was appointed state mine inspector, a post he held until 1933 when he was appointed inspector by the Pocahontas Fuel Co. He served Pocahontas in that capacity until his retirement in 1953.

Edmund A. Starling, safety director of Kentucky's Harlan County Coal Operator Association, died July 8 in Harlan, Ky. Mr. Starling was 60. Widely known throughout the Appalachian coal fields, Mr. Starling had been safety director for the Harlan operators since 1946. He was also secretary of the Harlan Mining Institute, the largest and oldest organization of its kind in Kentucky. Before joining the coal operators association he had been a state mine inspector and a safety director for the Blue Diamond Coal Co.

Parmanco

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HORIZONTAL DRILL



Easily cuts drilling time IN HALF



The H-81-53 drill is designed for drilling 5-6-8 inch holes to 100 feet or more. The greatly increased 81 h.p. engine in combination with the hydraulic feed makes possible the reduction of footage time by at least one half. All drive gears are totally enclosed. Power feed features direct hydraulic feed eliminating reduction gearing in hydraulic feed system.

This new drill—the very latest in design—is equipped with self-starter and generator, dual type front wheels, truck type rear axle with hydraulic brakes, and traction drive with both

forward and reverse. Here is greater speed in retrieving augers and four rotating speeds and reverse for drilling and cleaning the hole. Here is accuracy and mobility. Here is the modern answer to faster, lower-cost drilling.

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Mining motors

for heavy-duty mine equipment

depend on performance-proven

ROCKBESTOS A.V.C.

In building motors for heavy-duty coal mining machinery, leading motor manufacturers depend on performance-proven Rockbestos A.V.C. Motor Lead Cable.

For example, in building motors for use in Joy Manufacturing Company's 20BU-1 high capacity loader, the manufacturer specified and used Rockbestos Motor Lead Cable. This cable not only withstands oil and grease but also gives protection against starting overloads, high ambient temperatures and the many other operating tortures of heavy-duty mining equipment.

This Rockbestos A.V.C. Motor Lead Cable has also been performance-proven in mill motors and other heavy-duty stationary and traction-type motors.

You, too, can get trouble-free wire performance by specifying and using Rockbestos A.V.C. Motor Lead and Apparatus Cable. Remember, it'll keep its flexibility indefinitely — won't rot or bloom when exposed to grease — won't burn or carry flame.

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Is Industry Creating A New Breed of "Bonus Babies"?

THE STARTING SALARIES offered to this year's June graduates give the impression that industry is creating a new breed of "bonus babies." This is the term baseball fans apply to sturdy youngsters whose talent for hitting and throwing gets them payments of up to \$100,000 and other benefits for signing a contract.

For several years industry's demand for young college graduates, especially in science and engineering, has outrun the number receiving degrees. Competition for these young people has steadily pushed up the starting salaries and has induced many companies to indulge in lavish recruiting programs. This year engineering graduates are being offered well over \$400 a month, and even liberal arts graduates find numerous offers at \$400 or more. Only ten years ago the salaries offered senior engineering students averaged less than \$250 a month.

But any employer who assumes that high starting salaries alone will assure him the number of June graduates he wants is likely to be disappointed. A recent study by the McGraw-Hill Classified Advertising Division shows that most young engineers and scientists going into industry are more interested in their opportunities and in a company's future than they are in the size of their first paycheck.

Money Isn't Everything

In the McGraw-Hill survey, 2,596 recently-hired engineers and scientists employed in 57

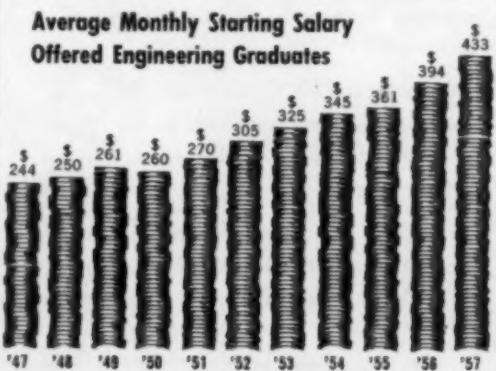
companies listed the factors they had considered before accepting a position. The replies of the younger engineers and scientists—those with less than five years' experience—have great significance for employers who want to make any impression in the highly competitive market for college graduates.

- Potential growth of the company was listed by more young engineers and scientists than any of the 42 other items on the list as a factor that influenced greatly their decision in accepting a position.

- Challenging opportunity was second.

- The company's prestige and reputation ranked third.

Average Monthly Starting Salary Offered Engineering Graduates



Data: National Industrial Conference Board, from annual surveys by Dr. Frank S. Endicott, Northwestern University.

Note: These figures were compiled during the fall previous to graduation and have risen by commencement in recent years.

- Progressive research and development program was fourth.
- Starting salary ranked only seventh.

Job and Future Most Important

As a group, the factors relating to the nature of the job, its future and the company's future had by far the greatest influence in attracting young engineers and scientists to their present positions. These include three of the top four attractions—potential growth of the company, a challenging opportunity and a progressive research and development program. Other factors in this group are the company's facilities, quick advancement, self-direction or little supervision, chance to work in a certain field, small size of company and rewards for individual accomplishment.

The second most important group of attractions had to do with prestige. These include the company's prestige and reputation, executive or professional standing and association with leading men in the field. Third in importance were financial considerations—starting salary, regular salary increases, financing of relocation, paid vacations and holidays.

A less important group of factors influencing young scientists and engineers were essentially social. Geographic location and educational facilities in vicinity ranked fairly high. But recreational facilities, suburban or country living, pleasant housing and cultural considerations had little appeal.

Ranking lowest, by a good margin, were factors having to do with security—permanent position; health, life and surgical insurance; retirement or pension plan; and sick leave.

It is interesting to note that some of the factors which influenced the smallest percentage of young engineers and scientists were country club memberships, use of company car, at-cost or low-cost eating place, travel opportunities abroad and being able to buy the company's products at a discount.

A Lesson For Employers

The lesson of this survey to employers who

What Factors Influence the Job Selections of Young Engineers and Scientists?

Factors Influencing Decision Greatly	Percent Listing Factor
Potential growth of company.....	55%
Challenging opportunity	53
Company's prestige, reputation	44
Progressive research and development program..	41
Geographic location	37
Permanent position	35
Starting salary	34
Educational facilities in vicinity.....	33
Regular salary increases	31
Chance to work on specific project, or in certain field.....	27
Company's facilities (laboratories, technical libraries, etc.)	25
Tuition for graduate study.....	25

Based on replies by recently-hired engineers and scientists with less than five years' experience to questionnaire distributed by McGraw-Hill Classified Advertising Division.

hope to recruit more young engineers and scientists is clear. High salaries and other financial appeals are important. But, at a time when high starting salaries are offered in abundance, our young graduates are interested even more in being with companies that will grow and in jobs that will permit them to grow. They are interested in jobs that offer opportunities for advancement, financially and professionally.

* * *

Were the young scientists and engineers who participated in the survey trying to impress somebody with their motives? If so, it could only have been to impress themselves, for all were asked to return their questionnaires unsigned.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

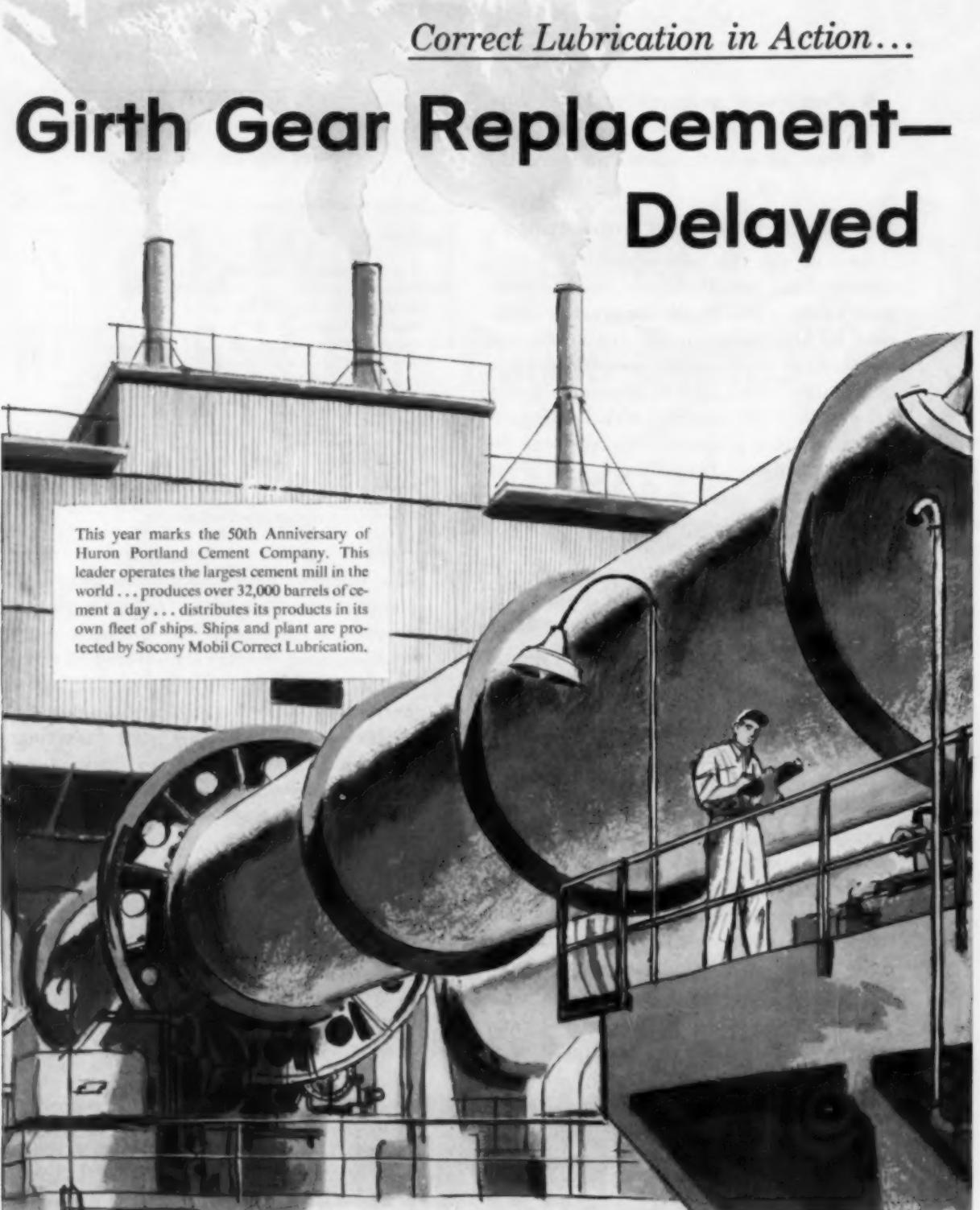
Donald C. McGraw
PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

August, 1957 • COAL AGE

Correct Lubrication in Action...

Girth Gear Replacement— Delayed



This year marks the 50th Anniversary of Huron Portland Cement Company. This leader operates the largest cement mill in the world . . . produces over 32,000 barrels of cement a day . . . distributes its products in its own fleet of ships. Ships and plant are protected by Socony Mobil Correct Lubrication.



SOCONY MOBIL

Leader in Lubrication for over 91 years

in the Cement Industry

Expenditure of \$8,800 Indefinitely!

**One of many maintenance savings made by the
Huron Portland Cement Company with the help of Socony Mobil**

Located at Alpena, Michigan, is the world's largest single cement plant. To assure its continuous operation at minimum maintenance cost, Huron Portland Cement Company relies on a Socony Mobil Program of Correct Lubrication. Here's an example of this comprehensive service in action:

Problem: Pinion gears on four kilns were wearing excessively . . . so also were the huge girth gears. In time, girth-gear teeth became so roughened that new pinion gears would be quickly damaged when installed. How to avoid the costly job of replacing the

girth gears was the problem facing the Company.

Solution: After consultation with Huron Portland personnel, Mobil engineers recommended a special Mobil lubricant compound that cut wear on pinion gears . . . at the same time helped smooth up the girth-gear teeth. Result—girth-gear life was extended indefinitely . . . \$8,800 saved on just one kiln.

Service like this has helped this cement company continually improve profits through increased production . . . reduced maintenance costs. Perhaps it can do the same for your plant.

Other ways Mobil Correct Lubrication cut costs



Exceptionally long product life—Allis-Chalmers generators supply power for entire Huron Portland Cement plant. Same fill of Mobil D.T.E. oil has been in continuous use in one of these generators for over ten years. Units have not shut down once due to lubrication failure. In fact, latest samples show oil to be in "like new" condition . . . good for many more years.

Gear maintenance cost cut—Mobil engineers surveyed planetary-type gear sets that drive mills, kilns and other

machinery. As a result, they recommended a single wide-range lubricant in place of three products formerly used. Qualities of this Mobil product eliminated periodic need to clean sludge from gear cases . . . extended oil fill life 100% . . . produced savings in storage and handling.

Engineering assistance cut downtime—Mobil engineers cooperated with Huron Portland in investigating cause of bearing and tooth failures on gear reducers. It was found that gears had been purchased from different suppliers and that tooth sizes varied. Mobil suggested purchasing new gears from one supplier. Mobil engineers also suggested that grooving in pressure area of split-bushing bearings be removed. When this was done, gear reducer trouble ceased . . . downtime was sharply cut.

Complete Mobil service—Supplying Huron Portland with top-quality lubricants is only a part of the comprehensive Mobil program. Mobil field personnel, engineers and sales representatives work closely with Huron Portland's maintenance personnel. They conduct in-plant training courses, make analyses of products in use, submit periodic reports on benefits achieved. No wonder records show a continual reduction in maintenance costs over the years.



Correct Lubrication

**A proved program to reduce
maintenance costs**

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Can your business co-exist with 70 million captive people?

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There is proof before us every day that the world can prosper fully only when men *everywhere* are free to choose their own way of life, build their own businesses and till their own land. Yet behind the Iron Curtain 70 million people are still virtual prisoners of the Communists.

There are a number of ways you and other American businessmen can help these people, yourselves and the world. One of the most direct is through Crusade for Freedom, sponsor of Radio Free Europe.

For six years, this powerful overseas broadcasting operation has been beaming the truth into five key satellite countries. It has been outstandingly successful.

The Communists have spent fabulous sums trying unsuccessfully to jam RFE's programs. The bill for this last year in Poland alone was estimated at \$17,000,000. *Two-thirds of this amount will support the entire RFE operation for another critical year!*

And we know from letters and reports that truth from Radio Free Europe has helped keep alive the desire for freedom. The proof is history.

So give your generous support to Crusade for Freedom in aiding these 70 million captives. If you don't send them the truth—who will?

Some ways business executives have helped. Check the ones you are interested in.

- Display Crusade material on your company bulletin board.
- Plan a paycheck stuffer to inform your employees of the importance of the Crusade for Freedom.
- Plan to conduct an in-company solicitation.
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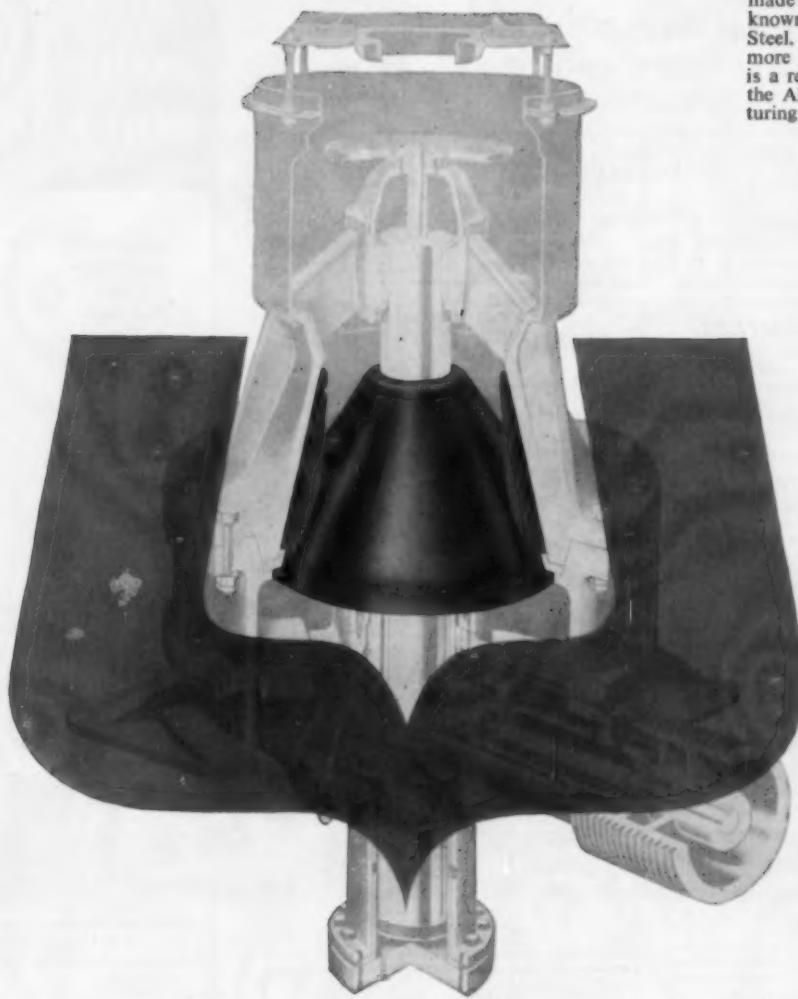
For campaign material

and information write **CRUSADE FOR FREEDOM,**

345 East 46th St., N. Y. C. 17.



Concave ring and mantle of this *Hydrocone* crusher are made of the toughest steel known... Amsco Manganese Steel. It *gives* a little, to take more punishment. *Hydrocone* is a registered trade-mark of the Allis-Chalmers Manufacturing Company.



How a little give adds a lot of life to AMSCO CRUSHER PARTS

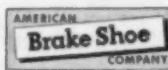
Both mantle and concave ring crush a lot more feed because of certain properties of Amsco® Manganese Steel. The metal *gives* a little under crushing forces, absorbs stresses, resists cracking and chipping. Yet these same forces work-harden the surface of Amsco Manganese Steel to as much as 500 Brinell... a high hardness, stubborn to wear.

Amsco Manganese Steel Crusher Parts main-

tain their ductile undersurface and work-hardened surface even when worn thin. That's why Amsco parts endure severe abuse for so many work hours without letup.

To be sure of getting Amsco Manganese Steel, order replacement parts from your crusher manufacturer. Amsco makes manganese steel parts for most manufacturers of crushing, grinding and pulverizing equipment.

Amsco also produces other alloy steels with maximum wear resistance under particular service conditions



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Oliver Building Pittsburgh, Pa.

K. PRINS AND ASSOCIATES

Engineers and Consultants
Coal Preparation—Layouts
and Construction Designs
Wellston, Ohio phones 4-3255-4-2293

DAVIS READ

Consulting Engineer
Layout — Operation
Modern Production Methods
Plant Design — Preparation

120 S. La Salle St. Chicago 3, Ill.

ROBINSON & ROBINSON

Consulting Engineers
Mine Operation — Preparation
Coal Property Valuation
Industrial Engineering

Union Bldg. Charlestown, W. Va.

J. PIERRE VOGEL

Coal Property Investigation
Coal Preparation
Oliver Building Pittsburgh, Pa.

J. W. WOOMER & ASSOCIATES

Consulting Mining Engineers
Modern Mines Systems and Designs
Foreign and Domestic Mining Reports
Oliver Building—Mellon Square Pittsburgh, Penna.

PAUL WEIR COMPANY

Established 1936
Mining Engineers & Geologists
DESIGN AND CONSTRUCTION
29 North Wagner Drive Chicago 6, Illinois

McGRAW-HILL MAILING LISTS WILL HELP YOU

- Merchandise your advertising
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- Sell Direct
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600,000 actual names of the top buying influences in all the fields covered by the McGraw-Hill publications make up our 150 mailing lists. These lists are built and maintained primarily for our own use, but they are available to you for Direct Mail purposes. Pick out a list of YOUR prospect from our Industrial Direct Mail Catalogue.

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McGraw-Hill Publishing Co., Inc.
330 West 42nd St., N. Y. 36, N. Y.
Please forward my free copy of the
McGraw-Hill "Industrial Direct Mail
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Company _____

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Have you tested your company publications lately? Do they really work for you? Today your entire operation is judged by each piece of literature you produce. If you have any doubt as to the impact of your vital communications, remember . . .

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TWS will write, design, and print your Instruction Manuals, Product Bulletins, Training Aids, Industrial Relations Literature, Annual Reports, Company Histories, etc. Save money and time. Let our staff be your staff for Technical and Business publications.

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This service is available through ad agencies.

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:

\$1.50 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

POSITION WANTED undisplayed advertising rate is one-half of the above rate payable in advance.

BOX NUMBERS count as 1 line additional.

Send New Advertisements or Inquiries to Classified Advertising Div. of Coal Age, P. O. Box 12, New York 36, for Sept. issue closing August 17

**Proven COST REDUCTION
PROGRAMS**
for the Coal Industry
HELMICK & ASSOCIATES
9619 LAKE SHORE BLVD.
CLEVELAND, OHIO

At Your Service . . .

These Classified Sections are at your service to bring business needs or "opportunities" to the attention of men in executive, management, sales and responsible technical, engineering and operating capacities with the industry served by this publication.

INFORMATION:

DISCOUNT OF 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals).

EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style. AN ADVERTISING INCH is measured $\frac{1}{6}$ inch vertically on one column, 3 columns—30 inches to a page.

DISPLAYED RATE:

The advertising rate is \$12.50 per inch for Equipment and Business Opportunity advertising appearing on either than a contract basis. Contract rates quoted on request.

EMPLOYMENT OPPORTUNITIES—\$21.00 per inch, subject to agency commission.

Replies (Box No.): Address to office nearest you
c/o This publication Classified Ad. Div.

NEW YORK: P. O. Box 12 (36)

CHICAGO: 520 N. Michigan Ave. (11)

SAN FRANCISCO: 68 Post St. (4)

BUSINESS OPPORTUNITIES

STRIP COAL WANTED

Lease or purchase—large or small tracts. Morgan Coal Company, 2850 North Meridian Street, Indianapolis 8, Indiana.

Coal Yard—Indiana, est. 30 yrs., 4 bins, tractor, 3 trucks, etc., 1956 sales \$57,155, increasing, land leased \$70 yr., price \$12,400 plus inventory. Apple Co., 1836 Euclid, Cleveland, O.

WANTED

ANYTHING within reason that is wanted in the field served by Coal Age, can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

WANTED

Fifty mine cars, 4 to 6 ton, steel, end dump, lift end gate, 42 inches high, 42 inch track gauge. Reply W-5669 Coal Age, 520 N. Michigan Ave., Chicago 11, Ill. Stating price, location, etc.

MINING MACHINERY FOR SALE

TRACKLESS EQUIPMENT

(C) 1-14BU 3PE Joy Leader
(C) 3-14BU 7RB Joy Leaders
w/38A Motor—permissible
(C) 4-14BU 3E Joy Leaders
(C) 2-8BU 50 Volt DC
(C) 2-8BU 250 Volt DC
(W) 2-Myers Whaley 53, Leader
(D) 2-650 Joy Shuttle Cars
(C) 2-108C Joy Shuttle Cars
(W) 2-32E7 Joy Shuttle Cars
(W) 2-32E10 Joy Cars—Rebuilt
(C) 2-20U Jeffrey, Rubber MTD
(C) 1-PLII—BPE Joy Elevator
(C) 1-PLII—BPE Joy Elevator
(C) 1-Joy Cat Tractor Rebuilt
(C) 1-T-10 Joy Cat Truck
(W) 4-40H.P. Arms Self Propelled Air compressors Permissible

BELT CONVEYORS

B—MTB 50' x 40' 1000 ft/min. tandem drives w/750 H.P. MTD structure. & 14,500' of Goodyear Coal Flo Belting. All material is like new & we will sell conveyors in any length desired.
I—Barber Green 36" conveyor, 2600' centers, extra heavy construction for outside. Installation. This unit was used a very short time & may be seen in operation.

CONVEYORS

(W) 2000'—30" Conveyor belting—Good condition
(C&W) 4-30' Howitt—Robbins & Joy Belt conveyor
(W) 2-65A Goodman 24" approx. 500'
(C&W) 23-61AM BIEW, BING, & 61W Jeffrey chain conveyors
(W) 4-12" Joy chain conveyors permissible
(C) 2-12" Joy chain permissible—excl.
(C&W) 6-G1200 G120 & 620 Goodman Shakers
AC & DC
(W) 1-PT12 Long Piggyback Conv.
(W) 1-PT15 Long Piggyback Conv.
(W) 32—Goodman Power Duckbills Model 477,
61½

MINING MACHINERY FOR SALE

(D) 1-200' Jeffrey Rope & Button

(W) 1-200' Center 42" Belt Conv. for tipple.
We have material to make up any length desired up to 800'.
(W) 2-42' x 35' Loading Booms
(C) 2-42' x 32' Loading Boom
(C) 1-CUTTING MACHINES

(G&W) 4-74U Track MTD. Sullivans

(W) 10-11B Sullivans, 35 & 50 H.P.
(D) 1-12G3 Goodman 220/440 Volt
(C&W) 10-12AB & 12AA Standard Goodmans
2-112A Baby Goodman
(W) 1-122A Baby Goodman
(C) 1-122B Baby Goodman, 220/440V.
6-512 Goodman
2-712 Goodman
(C) 1-320 Goodman, 42" t.s.
(W) 1-250 Jeffrey Ac Wall
(C) 1-250 Jeffrey, 220/400 V 42" t.s.—excl
(C&W) 6-300' Jeffrey Coal Cutters w/burgess
excl. Excellent condition as is or rebuilt
w/stub axle truckys

(C) 1-Lot machine trucks for Jeffrey & Goodman

CLEANING PLANT

This cleaning plant is still erected near Lake City, Tennessee, & is complete with the following:

7—Scrapers Conveyors
1—Bucket Elevator
1—Allis-Chalmers Vibrator
1—American Coal Cleaning Carbon Tables, (Air)
2—American Coal Cleaning Filter Tables (Air)
All motors are dust proof. 8.0, 220/440 V.,
dust collector, hoist, conveyor parts & accessories.
The complete cleaning plant consisting of 4 stories, was erected new in 1950. The equipment is extra good & we will sell the entire plant including structure at a fraction of its value.

LOCOMOTIVES

1-1 ton Ironton 42" t.s., 25" hi., Rebuilt
ton G.E. Goodman, 30" t.s., 25" high
2-4 ton Goodman's 38" t.s.
2-4 ton MH16 Jeffreys
1-4 ton MH12 Jeffrey
1-6T MH150 Jeffrey, Rob. 42" t.s., 25" hi
1-6 ton MH160 Jeffreys, 42" & 44" t.s.
2-6 ton MH165 G.E., 36", or 42" t.s.
or 44" t.s.
2-6 ton HM1623 G.E., 42" or 48" T.G.
2-4 ton HM1625 G.E.
3-6 ton HM1635 G.E., 25" high
1-6 ton G.E. Baudry—All new
2-6 ton 3314E Goodmans, 30" & 48" t.s.
1-6 ton 3000 Westinghouse
3-8 ton, MH110 Jeffreys, 36" t.s.
4-8 ton, HM1810 G.E., 48" t.s.
1-6 ton Goodman, 36" t.s.
2-10 ton MH75, 44" t.s.
1-13 ton Jeffrey MH110, 42" t.s.
1-4 ton Wall, 48" t.s.
1-Lot trucks, gears, Armatures for most of these locomotives.

MINE CARS

51-80' t.s. Drop Bottoms
100-80' t.s. Rotary Dumps 42" high
10-42' t.s. End Dumps, 18" high
23B-42' t.s. End Dumps, Various sizes
33-44' t.s. Drop Bottoms 10 ton
29B-42' t.s. Drop Bottoms various sizes
380-44' t.s. End Dumps, various sizes
and makes
355-48' t.s. S.D. Drop Bottoms
50-48' t.s. Rotary Dumps, 8 ton
130-48' t.s. Rotary Dumps

SUBSTATIONS

1-75KW Diesel Generator Set
1-150KW G.E. Motor Generator set
1-150KW Rotary, 2300/4000 automatic
AC & DC
1-150KW West. MG Set, 1200 RPM.
2200 V., 275 DC
1-120KW West. MG Set, 200V.
200KW G.E. MG Set, 1200 RPM.
2200 V., 275 DC
1-200KW HCC6, GE Rotary, 2300/4000
1-150KW Rotary Armature
1-200KW Rotary Armature

ELECTRIC AND MACHINE SUPPLY COMPANY

MINING AND INDUSTRIAL EQUIPMENT

WE ARE ALWAYS IN THE MARKET FOR GOOD USED EQUIPMENT

Call, Write or Wire Us, Day or Night

Whitesburg, Kentucky—P. O. Box 610—Phone 2223
Teletype #367Clarksburg, West Virginia—P. O. Box 227, Ph. Main 3-0253
Teletype #CB 59

* (W) Denotes Equipment Located at Whitesburg, Kentucky

* (C) Denotes Equipment Located at Clarksburg, West Va.

H. J. (HANK) UBBING

BILL CONLEY Please Direct Your Inquiries To Proper Location For Prompt Quotation—All Inquiries Appreciated

RAVEN MINING EQUIPMENT COMPANY
GOOD USED EQUIPMENT—PRICED TO SAVE YOU MONEY

A "Fair Deal" or "No Deal" or "RAMCO"

2-37 Coal Drills—DG
3-37 Coal Drills DG
1-6-12" Shaker Conveyor—size 1 pass
1-6-15 Shaker Conveyor—Coloma type pass
1-Vulcan Shaker Conveyor—Size 0 pass
1-61-AM Chain Conveyor
1-61-AM Chain Conveyor
1-30' 9' Aerial Vibe Da-Watering Screen
Edison Lamps, Chargers, Spare Parts
Electric Still—Flame Safety Lamps
1-Electric Mine Car Greaser
1-4000 Gal. Storage Tank
Mine Equipment—Drills, Press, Air Compressor
Grinders, Chain Hoists, Electric Drills, Anvils,
Vise—D.C. Binders—A.C. Welder—Hand tools
Sub-Stations, complete, 100 KW to 500 KW.
Locomotive Gens—Armatures—supplies, new and used
Link-Belt Tipples, Shaker—Fender, Booms, Car Re-
liefers, Electric, Diesel, Air, Hydraulics, Motors, Starters,
Transformers, Wires & Fittings
1007 Westinghouse 10 Ton Locomotive
32-14T Goodman 8 Ton Locomotive
Goodman 30-B 5 Ton Locomotive

Goodman 1000 K 3 ton Locomotive
MH-Jeffrey 80, 4 Ton Locomotive
MH-Jeffrey 80, 6 Ton Locomotive
1-Jeffrey 24 Low Vein Long Wall Machine, 230V
Jeffrey 35BB & 35-B Cutting Machines
CR-10 Sullivan, 15" high
35-Low Vein Cutting Machine, 17" high.
3-Goodman 212-AA low vein cutting machines—
250VDC
2-Goodman 212-AA Low Vein Cutting Machines—
3 Phase 220 VAC
1-Goodman 312 low vein cutting machine
1-Buddy Sullivan 212AA low vein trucks
Low Vein Machine Trucks for 212 and Standard
Goodmans
100 Mine Cars, end dump, 23' above rail
Fender, Hopper, H. P.
Rubber Tired Locomotive with 5 x 7 car
Fairfield Conveyor
Miller Auger Machine 5 H. P.

Come To See Us—Highway 460—We will try to help you

C. T. Adair, Mail Raven, Virginia—Telephone Richlands, Va. Day 5505 Night 5521

—TRANSFORMERS—

BOUGHT AND SOLD

We carry a large stock of rebuilt and guaranteed transformers, and invite your inquiries.

Custom-built transformers and coils manufactured to your specifications.

Expert Repair Service—all makes and sizes of transformers rewound, repaired and redesigned. Ask for our price schedule.

THE ELECTRIC SERVICE CO., INC.

5322 Hetzel St.

45 Years Dependable Service

Cincinnati 27, Ohio

SAVE MONEY!
UNUSED
6X6 ARMY TRUCKS

2 1/2-ton GMC & International



- From Government Storage!
- Unused and Guaranteed!
- Factory New Condition!
- Reconditioned Trucks also Available!

Save up to \$3,000 on one of our unused Army trucks. See for yourself how TWO of our trucks cost you even LESS than one new truck.

Compare our Tandem Axle Trucks with front wheel drive, 10 forward speeds, overdrive and new mud and snow tires with similar equipment elsewhere.

Investigate now! . . . There's no obligation . . . and we deliver on approval!

For Specifications, Prices, Delivery Write,
Wire or Phone Collect—Jackson 5-7841

MILTON Y. TOOMBS, JR.
Sales Manager

MEMPHIS EQUIPMENT
CONSTRUCTION AND AUTOMOTIVE
EQUIPMENT AND PARTS
786 SO. THIRD ST., MEMPHIS, TENNESSEE

BONDED EQUIPMENT BARGAINS

NEW CURRENT MODELS—IMMEDIATE SHIPMENT FROM OUR FACTORY—WRITE WIRE OR PHONE

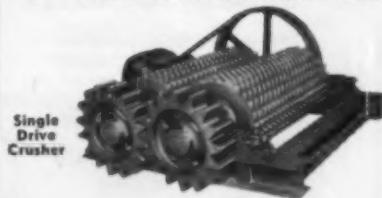
NEW BONDED® HEAVY DUTY VIBRATING SCREENS



HEAVY DUTY MODELS, TYPE BS:
Four bearing positive throw eccentric shaft; 3' x 6" to 5' x 14'; 1 to 5 decks. Write for New 8-page Bulletin No. 1087.

For mineral, chemical and other industrial products. Fast, efficient and economical for cleaning, sizing, grading, dewatering. Made in all metals including stainless steel. Enclosed models for hot materials or dust control. Bonded screens are built for any screening operation, wet or dry.

NEW BONDED® COAL CRUSHERS



Single Drive Crusher



Double Drive Crusher



Single Roll Crusher

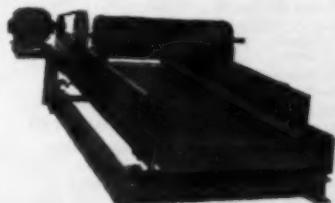
Bonded double roll crushers are available with single and double drive, in a wide range of roll diameters and face widths. Capacities from small to 500 tons per hour. Tooth roll models are for primary and secondary crushing of coal from stoker to 8". Will take feed sizes to 24". Teeth are designed to break materials sharp and clean with accurate sizing and a minimum of fines. Bonded double drive crushers are for larger resultant sizes to 8". All models are available with fine corrugated or smooth rolls or any combination of same for crushing Cinders, Pumice, Perlite, Other Expanded Lightweight Aggregate, Chemicals, Limestone Chips, Fertilizer and many other materials.

Bonded Single Roll crushers give you a wide range of resultant sizes and reduces run of mine coal in one operation.

All Bonded crushers have heavy coil springs that act as an adjusting mechanism as well as a safety device and they are complete with steel hoppers. Write for Bulletin #1119 describing complete line of Bonded Crushers. Priced from \$527.00

Model Number	Screening Area	No. of Decks	Sale Price
124AS	2' x 4'	1	\$ 443
224AS	2' x 4'	2	472
126AS	2' x 6'	1	472
226AS	2' x 6'	2	501
136AS	3' x 6'	1	581
236AS	3' x 6'	2	688
336AS	3' x 6'	3	956
138AS	3' x 8'	1	676
238AS	3' x 8'	2	815
338AS	3' x 8'	3	996
336BS	3' x 6'	3	1303
436BS	3' x 6'	4	1447
138BS	3' x 8'	1	1231
238BS	3' x 8'	2	1282
338BS	3' x 8'	3	1375
248BS	4' x 8'	2	1865
348BS	4' x 8'	3	2035
2410BS	4' x 10'	2	1953
3410BS	4' x 10'	3	2305
2412BS	4' x 12'	2	2319
3412BS	4' x 12'	3	2635
4412BS	4' x 12'	4	2833

NEW BONDED® GENERAL DUTY VIBRATING SCREENS



GENERAL DUTY SCREENS, TYPE AS: Eccentric weight mechanism, spring mounted, 1 to 3 decks, 2' x 4' to 3' x 8'. Write for New 8-page Bulletin No. 1086.

NEW BONDED® TROUGHING IDLER CONVEYOR BARGAINS

Complete Ready-Fab sections quickly and easily joined together on the job. We take our lead on our stock of short length belting. You can save as much as 50% on the **BONDED CONVEYOR SPECIALS** listed, with conveyor belting in two pieces. Conveyors are equipped with 5" roll diam. idlers and return rolls, 20" diam. head pulley and 16" diam. tail pulley mounted on 2 1/4" or 2 7/16" diam. shaft. Belt is new 4-ply, 28-oz. duck, 3/8" top rubber cover x 1/32" bottom cover and is fresh stock made by leading manufacturers.

Remember,
You Save
Up To
50%



CONVEYOR PRICES INCLUDE BELTING

Belt Width	Length of Conveyor	List Price	Sale Price
18"	25'	\$1477	\$ 794
18"	45'	2217	1166
18"	70'	3142	1646
18"	85'	3697	1933
18"	100'	4252	2220
18"	130'	5362	2797
20"	25'	1517	828
20"	60'	2882	1533
20"	90'	4032	2145
24"	25'	1590	898
24"	45'	2430	1330
24"	70'	3480	1875
24"	100'	4740	2514
24"	120'	5580	2950
30"	50'	2911	1617
30"	70'	3871	2119
30"	90'	4831	2614
36"	25'	1818	1118
36"	45'	2858	1678
36"	60'	3638	2096
36"	100'	5718	3214

For conveyors longer or shorter than those listed above, add or deduct the following per foot prices according to belt width. Prices include belting. Write for Bulletin #1138.

For 18" belt 19.24 per foot
For 20" belt 20.37 per foot
For 24" belt 21.78 per foot
For 30" belt 24.75 per foot
For 36" belt 27.95 per foot

NEW BONDED® FEEDERS



For high tonnage and controlled feed of Coal to Crushers, Screens, Conveyors, Mills and other process machinery. All models available in abrasion resistant alloy steel plate. Capacities to 250 tons per hour. Write for Bulletin #1140 and #1182. Priced from \$275.00

NEW CONVEYOR BELTING SAVE UP TO 25%

Heavy duty 4-ply, 28 oz. duck 3/8" top rubber cover by 1/32" bottom cover 12# to 15# average friction pull; 800# to 1000# average cover tensile rubber belting having high tensile strength, tough cotton duck, strong carcass and proper flexibility. For heavy boxes, bags and bulk materials. Troughs easily. Famous brands at deep cut prices. Fresh stock.

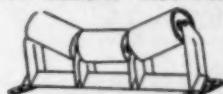
Width	Ply	List Price	Sale Price
18"	4	\$4.38 foot	\$3.39 foot
20"	4	4.82 foot	3.80 foot
24"	4	5.68 foot	4.26 foot
30"	4	6.97 foot	5.21 foot
36"	4	8.26 foot	6.18 foot

A high grade of heavy duty 4 and 5-ply 28 oz. duck, 3/8" top rubber cover x 1/32" bottom rubber cover, 16# to 18# average friction pull, 2500# to 3000# average cover tensile belting. For more severe service, high tonnages and abrasion resistant. For handling stone, mineral ores, ceramics, cement, coal and other similar materials, both wet and dry. Belt has molded rubber edges.

Width	Ply	List Price	Sale Price
18"	4	\$5.23 foot	\$3.83 foot
20"	4	5.73 foot	4.27 foot
24"	4	6.74 foot	4.94 foot
30"	4	8.28 foot	6.87 foot
36"	5	7.99 foot	5.78 foot

Other widths, plies, duck weights and cover thicknesses. Available at low prices. Write for Free Sample.

NEW IDLERS AND RETURN ROLLS 25% BELOW LIST PRICE



3-roll, 5" diameter Troughing Idlers for:
14" belt \$18.50 24" belt \$21.25
16" belt 19.25 30" belt 22.00
18" belt 20.50 36" belt 22.75
20" belt 20.75 48" belt 25.50

1-roll, 5" diameter Return Idlers for:

14" belt \$7.25 24" belt \$ 8.50
16" belt 7.50 30" belt 9.50

18" belt 8.00 36" belt 10.00

20" belt 8.25 48" belt 11.50

All steel. Interchangeable with other well-known makes. Furnished with easily replaceable pre-lubricated Sealed ball bearings. Also can be furnished with greasable type Alemite Fitted bearings at slight additional cost. Maintenance is negligible. Write for Bulletin #1138.

BONDED SCALE AND MACHINE COMPANY

PHONE, Days, Hickory 4-2186
2190 S. Third St.

WRITE FOR FREE CATALOG AND PRICES

PHONE, Evenings, AX. 1-2213, HU 6-3156
Columbus 7, Ohio

NOW DISMANTLING

BLUE BIRD COAL COMPANY MINE NO. 8 Harrisburg, Illinois

Latest type equipment, all truckless. Coal conveyed by belt.

- 1—Joy 11BU Cutting Machine with budusters and dual tires.
- 1—Joy super 14BU, SAE Loading Machine, like new.
- 1—Joy 14BU, 7RBE Loading Machine, 10 H. P. head motors. Excellent.
- 7—Joy GSC Shuttle Cars, perfect.
- 2—Joy 32E16 Shuttle Cars, hydraulic reel and steering, Elevating Discharge. All 7½ H. P. Motors.
- 1—Rubber-Tired Hydraulic Drill
- 3—Rubber Tired Pin-up Machines.

All the above 250 volt DC.

- 2—Joy T-1 Cat Trucks, 200 volt AC.
- 3—Joy 8-BU Loading Machines, 220 volt AC.
- 3—Goodman 512 Cutting Machines, 220 volt AC.
- 12—Rubber-Tired Battery Supply Tractors.
- 20—Rubber Tired Supply Cars.

Buy direct from the mine and take advantage of the huge savings!
Immediate delivery can be arranged to any point in America.

WRITE

WIRE
A. B. BIAS, SALES ENGINEER

PHONE

MACHINERY EXCHANGE COMPANY

Logan, W. Va. Box 1386
Phone 2533

Phone 40-F-3, Harrisburg, Illinois
or if more convenient

Ashland, Kentucky, Box 396
Phone East 4-2101

COAL CRUSHERS

- 1—24" x 24" Jeffrey Single Roll
- 1—30" x 30" Jeffrey Single Roll

COAL CUTTERS

- 5—Goodman type 112 shortwall, A.C.
- 1—Sullivan type 7B super-shortwall, A.C.
- 3—Sullivan type 7B super-shortwall, D.C.
- 6—Sullivan type CE-7, A.C.
- 1—Jeffrey type 28-A, A.C.

SHAKER CONVEYORS

- 7—Goodman type G-20
- 6—Goodman type G-15
- 1—Joy type UN-17
- 4—Vulcan type 25-30

CHAIN CONVEYORS

- 1—Jeffrey GL-HG face conveyor
- 1—Jeffrey GL-W room conveyor
- 1—Jeffrey GL-EW elevating conveyor

PICKING TABLES

- 1—30" x 41 1/2" Card pan conveyor loading boom, two sections
- 1—48" x 51" Card pan conveyor loading boom, two sections

BATTERY LOCOMOTIVES

- 3—3/4 ton Mancha, 24" ga.
- 1—1 ton Westinghouse, 24" ga.
- 1—1 ton Ironton 36" ga.
- 2—6 ton General Electric, 36" ga.
- 2—7 ton General Electric, 36" ga.
- 1—7 ton Atlas, 36" ga.
- 3—8 ton Ironton, 36" ga.
- 2—8 ton General Electric, 36" ga.
- 2—8 ton Goodman, 36" ga.
- 4—10 ton Atlas, 36" ga.

TROLLEY LOCOMOTIVES

- 2—10 T. Jeffrey, 42" ga.
- 1—13 T. Goodman, 42" ga.
- 1—13 Jeffrey, 42" ga.
- 1—15 T. Jeffrey, 42" ga.

SHUTTLE CARS

- 1—Joy model 6003P, battery operated
- 1—Joy model 6001, battery operated

MINE FANS

- 1—120" Joy La-Del axial flow fan, model L-24
- 1—7" Jeffrey aerodyne 2 stage fan

SINCE 1898 DEALERS IN DEPENDABLE
RECONDITIONED MINING MACHINERY
OF ALL TYPES

MORSE BROS. MACHINERY COMPANY

2900 Brighton Blvd., Denver, Colorado

20# — 30# — 40# NEW RAIL IN STOCK

LEFTON INDUSTRIAL CORP.
Genl. Office: 212 Victor St.
St. Louis 4, Mo.

USED MOTORS

- 1—G.E. Type I, Form M, 600 RPM 250 H.P. 440 volt slip ring
- 1—Westinghouse Type CS 200 H.P. 700 RPM, 2300 volt
- 2—Allis-Chalmers Type AN 40 H.P. 1750 RPM
- 1—G.E. Type MT 327, 40 H.P. 1750 RPM
- 2—G.E. Type MT 326, 1200 RPM 25 H.P., 2200 volt slip ring
- 1—G.E. Type RCP 35, 100 H.P. 1750 RPM
- 1—Westinghouse Type SK, 50 H.P. 230 volt DC, 1700 RPM
- 1—Fairbanks Morse Cent. Pump, Size 4, 790 GPM, 252 ft. head connected to 100 H.P. F.M. motor, 2200 volt, 1750 RPM

USED PUMPS, COMPENSATORS

United Electrical & Machine Co.
317 Cherry St. Terre Haute, Indiana.

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- 1—620 Page Dragline
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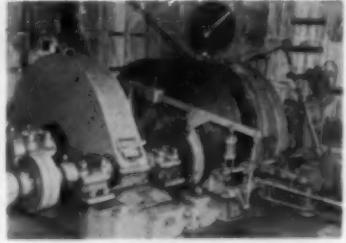
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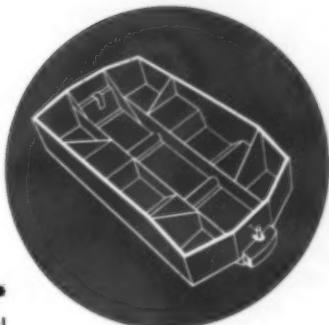
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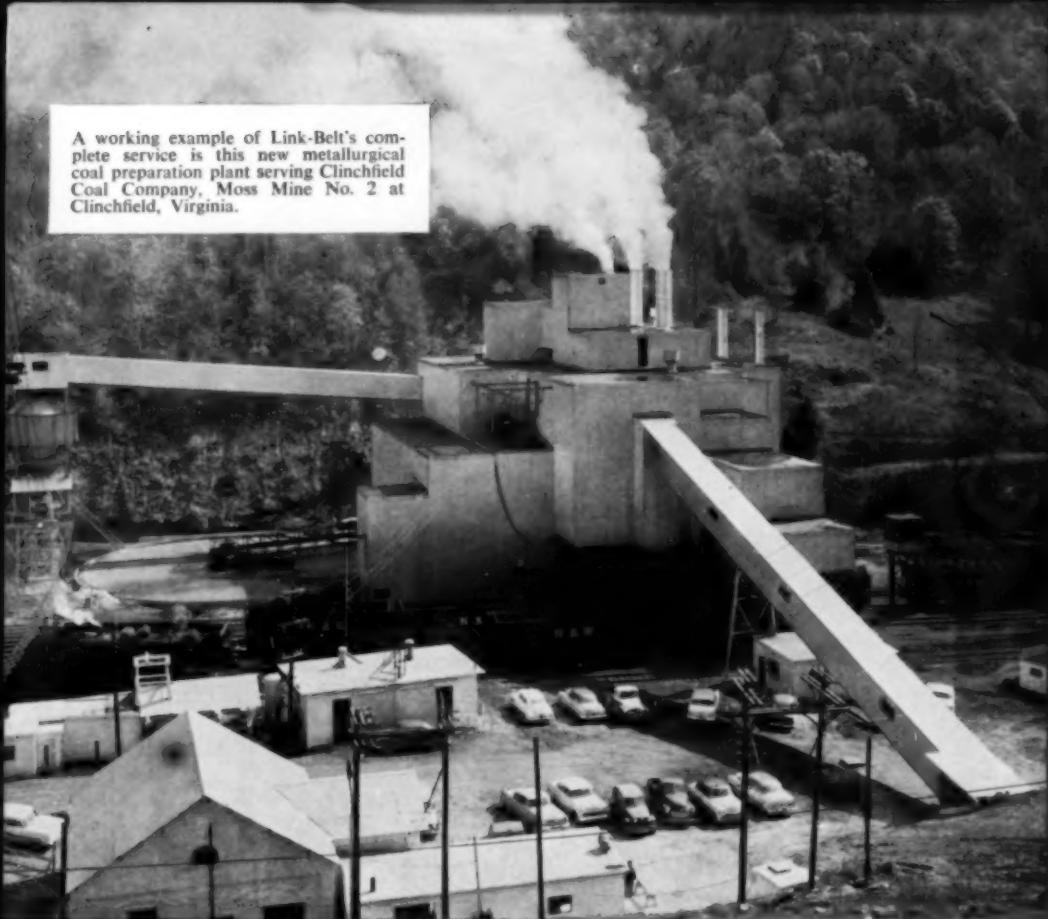
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